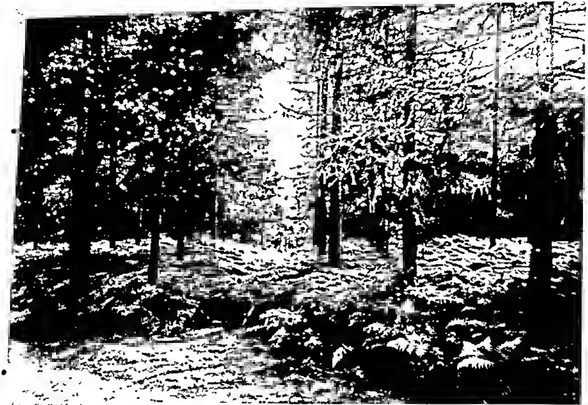
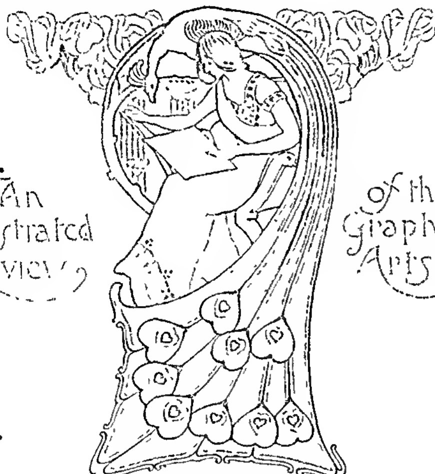


"Then for a moment did the setting sun glance sidelong o'er the ferns:
A parting smile, ere he should leave them for the night."

Penrose's Pictorial Annual



An Illustrated Review of the Graphic Arts

1904-5

THE PROCESS YEAR BOOK

Edited by
WILLIAM GAMBLE

Gold Medal Diploma Paris Exhibition 1900

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VOLUME II., 1896, published at 2/-; sold out, copies obtainable fetch 7/6 each
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☞ *Back Volumes become more valuable every year, and should be at once secured. We shall be pleased to assist those wishing to make up complete sets in obtaining the out-of-print volumes. Those wishing to dispose of the scarce numbers should communicate with us.*

NOTE.—Owing to the cost of freight and customs duties, the price of the PROCESS YEAR BOOK will vary in different countries. The above are the published prices in London. Postage is in all cases extra.

ACKNOWLEDGMENTS.

THE INKS chiefly used in the printing of this book have been specially manufactured for us by **Messrs. A. B. Fleming & Co., Ltd.,** Caroline Park Works, Edinburgh, who have given special care and study to the exacting requirements of such a varied series of colour and monochrome subjects

The following list will be useful to printers who desire to repeat the colours

Fleming's Inks.

TEXT: *Fleming's Process Black, 66xA*

ADVERTISEMENTS Fleming's Process Black, 66xA and Scarlet Lake 1126

ILLUSTRATIONS Fleming's Rich Deep Process Brown, between pages 4 and 5, 100 and 101, 112 and 113

Fleming's Process Blue Black, Deep Shade, 1316, between pages 4 and 5, 100 and 101, 112 and 113

Fleming's Process Grey Black, between pages 8 and 9, 16 and 17, 152 and 153

Fleming's Greenish Black, between pages 20 and 21, 24 and 25

Fleming's Purple Black, between pages 20 and 21 24 and 25

Fleming's Process Landscape Green Black, between pages 72 and 73

Fleming's 37xA, Black, between pages 120 and 121, 144 and 145

THREE-COLOUR ILLUSTRATIONS Fleming's Neutral Photochromic Inks

THE INITIALS, Tailpieces and Border Designs, except where otherwise stated, have been executed by Mr F Pissi "Langford," 62, Leigh Road, Southend on-Sea

THE TYPE used throughout the text has been composed by MESSRS PERCY LUND, HUMPHRIES & Co LTD, on the Lanston Monotype Machines

THE DE VINNE-BIERSTADT OVERLAY has been used in printing the principal portion of the half tone blocks in this book and has been found eminently satisfactory

INDEX TO ARTICLES.

*** The Editor regrets that it has been necessary to [illegible] several articles which arrived too late or were crowded out in making up the sheets.*

INDEX OF ILLUSTRATIONS.

PLATE.

COLOUR PRINTS.

\. *The Editor regrets that it has been necessary to leave out several colour prints owing to the impossibility of printing them in time*

SUPPLEMENT ILLUSTRATIONS.

. *The Editor regrets that it has been necessary to leave out a number of half-tone blocks which arrived too late or were crowded out in making up the sheets.*

ILLUSTRATIONS IN THE TEXT.

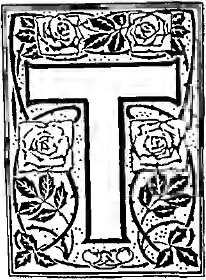
** *The Editor regrets that it was impossible to make use of all the photographs he received, but a number of those which are left over will be used in next year's volume, further photographs for which will be welcomed*

ENGRAVERS' ADDRESSES.

PHOTOGRAPHERS', ARTISTS' AND PUBLISHERS' ADDRESSES.

AUTHORS' ADDRESSES.

BY THE WAY.



Design and Block by ARCHIBALD & FOWLER

THE editorial difficulty in the preparation of this, the tenth volume of the PROCESS YEAR BOOK, has been not that of securing an adequate supply of high-class illustrations and interesting articles, nor that of attaining the standard of excellence shown by former volumes, but rather how to find a place for all the good things which have been sent in with such lavishly generous spirit by our contributors.

The price of this book naturally imposes a limit on its size, and it is only a fortunate combination of circumstances which enables us to present to the public a work of unrivalled value, regarded only in an intrinsic sense.

The ungrudging way in which our contributors extend their help, makes it difficult for us to refuse any contribution, and if some do not come exactly up to the very high standards of present-day work, we feel it still our duty to give them a place, and so provide encouragement and incentive for further efforts. In many cases specimens which are not of the highest quality reach us from small, and in many cases, to our knowledge, struggling firms, and a lift such as the YEAR BOOK can give them is a kindly and deserving help. If our reader will look back over former volumes they will see work of firms of the highest rank to-day, which seem woefully poor in comparison to their specimens in the present volume. This must be our excuse to any who are disposed to be hypercritical, and who may think the editor has been wanting in judgment in allowing imperfect examples of work to appear

Turning to such evidences as the book affords of the progress of process work, we cannot help thinking that on the whole there is a distinct advance. The ordinary black and white half-tone is better than ever and the firms engaged in the business are turning out a more and more uniform quality and making an ever-increasing output. In the monochrome results, variously known as Duotypes, Duplex Half-tones, Vandykes, Tinted Half-tones, printed in two or more workings, remarkable variety and excellence are shown, together with some novelty. *It is in such work as this that the highest skill* of the half-tone worker is displayed, for the result is not obtained wholly by mechanical means, it requires some artistic perception to produce the wonderfully rich tones and effects of light and shade which are attained in some of these blocks with only two simple printings.

As regards colour work, wonderful advances have been made, as results show; nevertheless, there is not any progression in the main principle of the three-colour idea. No important new discovery has been made in screens, or colour sensitizers, or inks, or methods—the crispness and better colour rendering are purely the results of the skill which comes of practice and experience, enabling the processes to be used to better advantage. The photographic element of three-colour work has been carried as far as it can be in the light

of our present knowledge, and three-colour workers are bound to admit that successful results cannot at present be obtained by purely photographic means. Resort is made to considerable hand work in the etching and finishing of the blocks, and in many cases the negative has played but a comparatively unimportant part in the achievement of the result. Some firms have not scrupled to add a fourth colour, and we must admit that the result has justified this departure from the orthodox principle. In other cases excellent colour work has been done from a single negative.

We firmly believe, however, that these meretricious aids are but stepping stones to the fuller realization of the fundamental idea of three-colour printing—the rendering of colour by purely photographic means—and that as apparatus, materials and methods are perfected, the necessity for tedious hand work will diminish.

The circumstance that we have attained the tenth year of publication of our annual is one which affords us considerable satisfaction. We seem to have arrived at the top of a steep hill by toilsome effort, and we can look back on a fair valley we have left below, but without desire to turn back or to stand still, because before us is a vista of still fairer promise.

Ten years is a short period as history is made and measured, but it has been long enough for process workers to achieve a great deal. Few modern industries have progressed at such a rapid rate, and few have so rapidly and completely revolutionized or superseded older methods. Several crafts, such as wood, steel and copper engraving have been ruined by the newer processes, whilst lithography has been seriously affected.

Who knows but that the present dominant processes may in their turn be ousted by some new means of graphic reproduction? Many new processes are in the air, and those who know best are well aware that much remains to be done by way of research, experiment and practical trial to bring about greater perfection. We cannot doubt but that the younger and brighter men of the business will not be content to sit still and ignore the chances of improvement that await them. Competition every day makes the struggle by old methods keener, and this must, as always, be the incentive to greater progress. It has been well said that the greatest discoveries have been made by leaving the beaten tracks and going out into the bye-paths; and that is a truism which should furnish a motto for thoughtful workers in the coming year.

Design and Block by
Archibald A. Fowler

ULYSSES DERIDING POLYPHEMUS

By J M W Turner, R A

Reproduced direct from the original painting in the National Gallery, by André & Sleigh's Special Three-Color process

Printed by André & Sleigh, Ltd., Bushey, Herts.

FLAXMAN'S "DANCING HOURS."

Jasper Placque from the original moulds by Messrs Josiah Wedgwood & Sons, Ltd., Etruria, Staffordshire.

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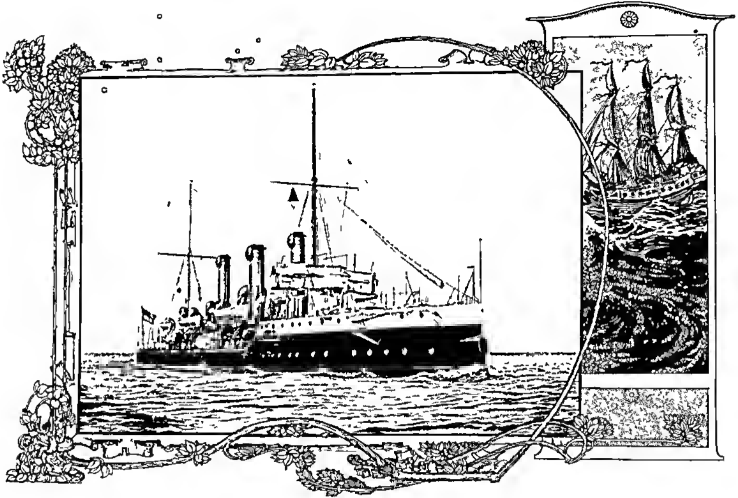

TORPEDO-GUNBOAT.

From a photograph by
G. West & Son, Southsea

Book Illustration.
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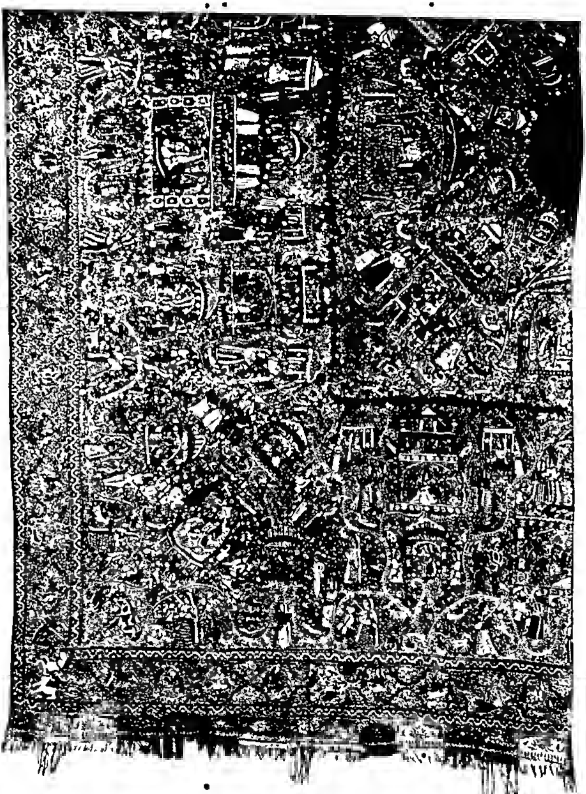

INDIAN SHAWL.

Reproduced direct from the object by Andre & Sleigh's Special Three-Color process

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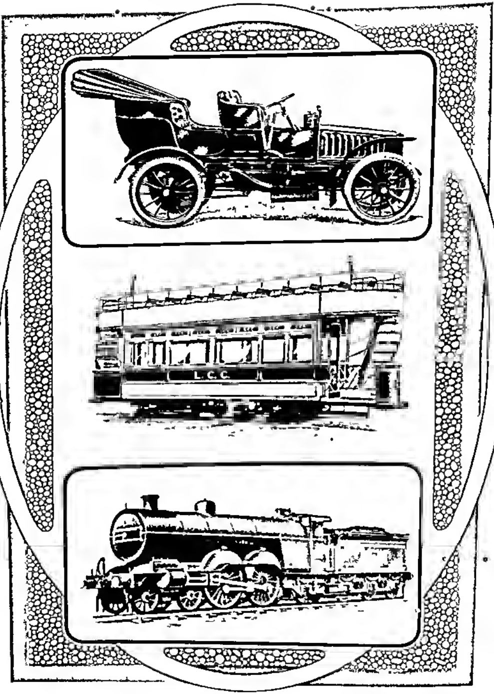


THE POWER OF THE AGE

O' MISTRESS MINE

E. A Abbey, R A

Reproduced by permission from the original painting in the possession [illegible]

THE EDITOR'S NOTES.

PORTRUSH (North of Ireland)

Block by Bursill & Ladyman — Photograph by Wm. P. Thompson

AS my contributors by their extreme generosity have almost crowded me out this year, I content myself with a few notes on some processes, which appear to me to indicate really notable progress. The old adage that there is nothing new under the sun finds frequent exemplification in process work and I should be reluctant to describe anything as absolutely new. Progress in process work consists for the most part of discovering new ways of working old ideas, and it is a mistake to adopt the nil admirari attitude that so many are apt to do when any alleged new idea is brought before them. One too often hears the remark: "Oh, that's nothing new; I saw that done twenty years ago." The novelty may consist only in discovering an application in the present day for an idea which was no use twenty years ago, or in so improving on the old idea as to make it practicable where before it was not so.

IMPROVEMENTS IN COLOUR WORK.

I cannot call to mind anything distinctly new in colour work evolved during the last year, yet colour work has been vastly improved in detail. There have been several new sensitizers for colour work introduced in the past year, but they are only new products from old bases. We still await the ideal colours for screens, for sensitizers and for inks, which will make colour work perfect. Recently I had the pleasure of seeing the four-colour machine which Mr. Harvey Dalziel has introduced into this country. It is wonderful to see the white sheets fed in at one end and come out at the other at the rate of 900 per hour, covered with two, three or four-colour prints, and it ought to have an immense influence on the future of three-colour work. But here again it is not new. It is the Lambert Machine which has been steadily worked out in Paris for some years past, and it is already working in Berlin, whilst in principle, it is but four Wharfedale pattern machines blended into one. Nevertheless, it is ingenious and a notable advance on every multi-colour machine I have hitherto seen, chiefly because it is really practical and understandable by the average machine minder; besides, its various operations are individually controllable. It would not do, perhaps, to put together on one sheet the blocks of different makers, because every one requires a different set of inks and different treatment, but where only one class of blocks is dealt with at a time, the results will be quite successful. In Berlin, where it is running only on Dr. Albert's Citochrome blocks in four colours it is found to answer admirably.

MR. U. RAY'S HALF-TONE RESEARCHES.

My readers will miss this year an article from the classical pen of Mr. U. Ray, B.A., on the principles of the half-tone process, which he has so deeply investigated. From correspondence I have had with Mr. Ray, I know that up

in the present volume, asking them to examine the dot effect, gradation, and texture, rather than the general technical quality, for it cannot be expected that Mr. Ray can equal the finish of the blocks of the best London firms. When it is remembered that the negatives are made on dry plates and that there is no fine etching, we think it will be admitted that the result is remarkably good.

A "High-Light" Lithographic Process.

Many attempts have been made to adapt the half-tone process to lithography and more money has been spent by some lithographic firms than they would probably care to admit, in efforts to adapt photo-mechanical processes to lithographic work. Experimenters have attacked the problem from two directions, one section attempting to adapt half-tone with the ruled screen, the other seeking to secure the photographic reproduction by means of a grain of irregular character. In both cases the results have been generally flat or muddy in appearance, because no perfect way could be devised of keeping the high-lights clear of the screen or grain.

It is not possible, or at all events not easy to adopt the "fine etching" methods of the block maker, who by successive re-etchings and stopping out of portions sufficiently etched would reduce the size of the dots in the high-lights to the merest pin points, because such etching would have caused a relief on the lithographic plate, which would be fatal to its printing quality. The roundabout method was accordingly adopted by some firms of having half-tone blocks made as for letterpress printing, and using these only for the purpose of making transfers. Apart from the expensiveness and slowness of this method, it was objectionable because there must necessarily be some spreading in taking the transfers and putting them down on the stone or lithographic plate, to say nothing of the possibility of stretching. So disappointing, indeed, have been the results of attempting to use the half-tone method in lithography, that many firms have given it up in despair, and they have to be content to see the best paying kinds of lithographic work superseded by the work of the half-tone block maker and letterpress printer At this juncture, I am pleased to chronicle a new process which seems to come like a ray of hope for the lithographic printer. Mr Frederick Sears, a lithographer and process engraver, who, after a successful business career in New Zealand, comes back to the homeland to exploit what may be described as "a high-light lithographic process" It is just one of those *inventions which one wonders at never having thought of before*. As to the results, they are perfect. I do not remember having seen half-tone negatives in which the gradation was so correct. The ideal dot effect from shadow to high-light, which every process worker aims at, is here to perfection, but with the difference that there are no dots in the highest lights, these portions being continuously opaque. The result is, of course, that when printed on to plate or stone, there is no screen over these portions and consequently the picture is wonderfully crisp and bright. For colour work, the process is splendid because the colours which are stopped out are quite opaque on the negative and quite clear on the print. Thus a vast amount of hand-work is saved, which would be necessary if one desires to utilise the usual half-tone negatives. The colour rendering is accordingly excellent, and the proof has a crispness and brightness which is distinctly pleasing. The process has other applications, such as for intaglio work on copper, for vignetted half-tones, combination line and tone work, etc. I am sorry the process came under my notice too recently to leave time to get a specimen of it done for inclusion in the present Year Book.

Engineers' Prints.

Many improvements have been made of late in the methods of maki prints from engineers' tracings. The direction in which it has been fou possible to reduce the time of production has been chiefly in the exposure. Inste of leaving the prints out in daylight for hours, or sometimes days, in dull weath nearly all important firms print by electric light. So long, however, as t old-fashioned flat frames were used, this was very unsatisfactory, owing to t difficulty of getting contact of the prints with the tracings and securing ev illumination. The cylindrical and semi-cylindrical printing apparatus w the first attempt to solve this difficulty. A sheet of plate-glass was bent to half-circle and the tracing with the sensitive paper in contact with it laid ov the surface, a canvas apron being drawn tight over the back. The glass, whic was supported in a frame and swung on trunnions, was brought to a vertic position, and an arc lamp suspended in the hollow of the half-circle. Furth improvements led to the lamp being made to gradually descend by clockwor so as to evenly expose the whole of the print. It was also soon found that was quite possible to expose two prints at once by making the apparatu cylindrical with two half-circles of glass joined together. Cylinders up to 9 c 10 feet in length have been built in this manner, and the apparatus has bee brought to the greatest perfection. However, it seems likely now to give plac to a still better principle. This consists of the adoption of the rotary principl which has been applied with so much success to letterpress and lithographi printing, and latterly to bromide photo-printing. At the Elswick works of Si W. G. Armstrong, Whitworth & Co., Newcastle-on-Tyne, there is, we believe the largest photographic department in the kingdom in connection with ar engineering firm, and an enormous number of prints of all kinds and sizes are turned out annually, not only by the cyano., ferro., and gallic and black line processes, but by silver printing, platino printing, bromide printing, etc., whilst photo-zincography in line and half-tone is being gradually developed. The department owes its success to the organizing ability and inventiveness of Mr. J. E. Goold, the chief photographer, but also not less to the liberality of the firm in permitting him to carry out the latest ideas. Mr. Goold has the distinction of having used the largest vacuum printing frame probably in the world, the pressure being applied by exhausting the air from under a rubber sheet which covered the back of the printing paper and tracing, thus utilising the pressure of the atmosphere. This frame, as I remember seeing it, was something like 10 ft. long by about 4 ft. wide. It was exposed by means of two powerful open type arc lamps. This arrangement, as well as the cylinder printing apparatus, seems likely to be superseded by a novel apparatus which Mr. Goold has recently designed and had made in the Elswick works. It consists essentially of a cylinder formed of glass segments, which is slowly revolved in a horizontal direction, whilst a web of the sensitive paper is fed on to it, and at the same time the tracing to be printed is fed in in contact. Powerful arc lamps are directed on it and the prints are fully exposed by the time the print has passed them. In this manner cyanotype prints 40 inches wide can be made at the rate of 200 feet per hour, ferro-prussiate prints at 100 feet per hour, ferro-gallic at 60 feet per hour. It would be quite possible to feed in large celluloid film negatives, or even pieces of lace, with the advantage that the whole length of a lace curtain could be printed on to the paper. Thin zinc could also probably be printed in this way, so that the machine opens up great possibilities. It has been working successfully at Elswick for about seventeen months and does nearly as much work as two of the vertical cylinders. One great feature of the new system is that prints of any length can be done, which is of great value for large continuous drawings. Probably further developments of the machine will be made, but even if it were carried no further, it constitutes a remarkable advance on existing methods.

Prabodhananda.

(Mrs. Louise Greenidge, of Chicago.)

Block by U. Ray.
(Made with Ray's Indicator, using
133 cross line screen.)

Photograph by
Beatrice Tonnesen

I'm Here.

Photo and Block by
U Ray.

Negative made with Ray's Screen Indicator
using 80" Line Screen Single etching

Storm and Sunshine.

Photo and Block by
U Ray

Negative made with four line Screen and
Ray's Indicator Single etching.

I'm Here.

and Block by
y.

Negative made with Ray's Screen Indicator
using 60° Line Screen   Single etching

Storm and Sunshine.

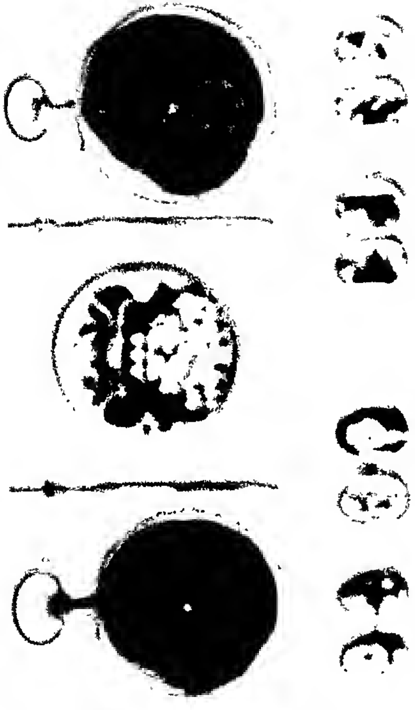
Photo and Block by
U Ray.

Negative made with four-line Screen and
Ray's Indicator Single etching.

The Country Girl.

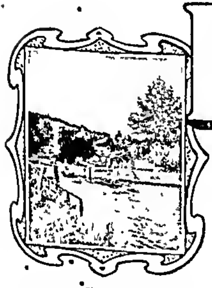
Block by
Freeman & Freeman

Photograph by
E. E. Hindley



A WONDERFUL MACHINE. HOW THE TYPE WAS SET FOR THE YEAR BOOK.

By THE EDITOR.



THE LOCK

Block by WATTS & GIBBS

Photograph by J. C. PHYTHIAN

IT is an interesting circumstance that this year our ANNUAL is "machine set" Printers know what that means, but the process man and the ordinary reader probably do not know the significance of this technical expression For the benefit of the latter, therefore, we will endeavour to describe in a simple way the very wonderful machine which has made it possible to dispense with the old laborious and tedious way of picking up type letter by letter by the deft fingers of the compositor.

Type-setting machines are by no means a new thing, but it is only of late years that they have been brought to the pitch of commercial perfection and success. Until it was realized that such machines must not only set the type but cast it from the molten metal, they only had a limited field, and even when it was demonstrated that this could be done satisfactorily printers would only concede that such machines were practicable for rough newspaper work, where any little deficiencies in the face of the type would not be noticed owing to the rough character of the printing. The high-class book and commercial printer held aloof from type-setting machines, his objections being carefully nursed by the type founders, who naturally saw that such machines meant the ruin of their industry.

The machine which has changed this feeling, and which is in fact revolutionising the printing trade, is the Lanston Monotype, which deserves to be recorded as one of the most remarkable and epoch-making inventions of modern times. Even in its case printers have grudgingly conceded its advantages. At first it was said that type-setting machines could never give the beautifully cut faces of ordinary type, but the Lanston showed that it was possible to go even better, and there can be used with it about thirty gracefully cut founts, many of which are of a style which would be approved by the most fastidious disciples of William Morris.

pumped into a matrix, and this type is cooled, trimmed and set in position for forming the words which are being set. As many as 13,000 letters per hour have been set in this way, though in practice it is not run at such a high speed, the saving over hand-set composition being quite appreciable enough when run in a normal way.

The mechanism by which the human-like movements are accomplished is naturally a marvellous example of mechanical skill and accuracy, which never fails to excite the wonderment of the on-looker. It would be impossible in this necessarily brief and intentionally non-technical article to describe even cursorily the various features of the machine, and we must, therefore, leave our readers to take for granted the ingenuity of its mechanism. It is capable of dealing with any class of composition, from poetry to railway time-tables, and any size and style of face from Pearl to English.

The Lanston Monotype is, indeed, the greatest mechanical boon ever presented to the printer. It is rapidly changing the whole life and aspect of our printing offices, and undoubtedly it is a machine which must immensely influence the future of letterpress printing.

A Rock-girt Stream

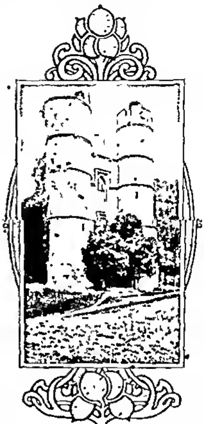
Block by
Watts & Giles

Photograph by
F. B. Tate

may be all very well, said the unprogressive printer, to use machine-set composition and the faces are certainly very nice, but you cannot print on highly-glazed coated paper with fine ink, because of little imperfections in the casting of a letter here and there; so long as you print on an imitation hand-made paper with rough surface capable of taking plenty of ink and a strong impression you are all right, but never on smooth art paper, so that half-tone blocks cannot be made up with machine-set type. Again it was urged that where the latter was made up with blocks the spaces tend to rise and mark the paper, being cast a little higher than the spaces for hand-setting.

It has been left to the printers of the PROCESS YEAR BOOK to most fully and completely dispose of these two last objections There cannot be a more crucial test for the Lanston Monotype than the highly-glazed paper, the minimum quantity of the stiffest and blackest ink which must be used upon it, and the profusion of blocks, many of which are inserted into the type pages in the most intricate way. Surely, if there was ever any truth in the objections we have stated it would become apparent here How far the Lanston Monotype has triumphed over these objections we leave our readers—even the most technically critical of them—to judge

The most fastidious *dilettanti* in typography could hardly take exception to the graceful lines of the old style Roman face we have selected for the text pages, and probably if the fact had not been here stated no one would have known that the YEAR BOOK was machine-set. We are, however, glad to give publicity to the fact, because we consider it a notable achievement, of which the Lanston Monotype Corporation, our printers and ourselves may be justly proud.



DONNINGTON CASTLE NEWBURY

Block by WATTS & GILES — Photograph by F. G. O. STUART

A word about the nature of the Lanston Monotype will be interesting to many of our non-printer readers Imagine an over-grown typewriter carrying no fewer than 257 keys, these keys, instead of being connected to levers as they are in a typewriter, are simply caps to small brass rods (called plungers) which are held up to the highest point of pressure by compressed air. When depressed they let air through holes which only coincide when in that position The compressed air forces up punches which perforate circular holes in a strip of paper. When complete this paper looks somewhat like the music strips on mechanical pianos and organs The strip is placed in a second machine, which may be in quite another part of the premises, and which casts the type Every time a hole in the paper strip coincides with another hole in the machine a type is cast, with molten metal,

SPRAY COLOUR PRINTING.

SPACE only permits of a brief reference to the sample of colour printing on the opposite page, which is really "something new under the sun." The first printing is in the ordinary way from a half-tone block, but the colouring is done by a machine which distributes colour by compressed air. Four operations or printings were done for the specimen shown. Different tints can be applied to different parts of the pictures at one operation and the super-imposing of tints produces additional tones and gradations.

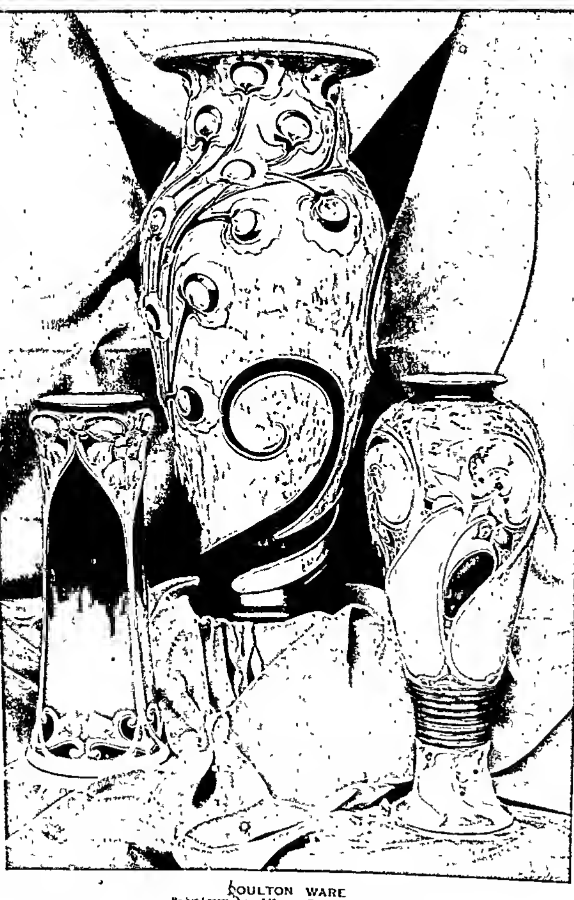
The cards are placed under a clip by an attendant as in the ordinary printing machine and are automatically fed into and out of the machine, the colouring being entirely automatic.

Very delicate gradations of tints are possible and great brilliancy of colouring obtainable. The grain is irregular, but so fine as to be scarcely perceptible under a microscope. The machine is destined, we believe, to be very useful for colouring photographic prints and engravings, as well as for decorative printing where only shaded work is wanted. It is also capable of producing the beautiful effects in embossed work where the colours are distributed at an angle with the surface, heightening the effect of relief and giving the delicate effects of iridescence.

THE SAILOR'S LASS

Block by
[illegible]

Photograph by
[illegible]



DOULTON WARE

By kind permission of Messrs. Doulton & Co. Ltd.

Reproduced in Three Printings
By JOHN SWAIN & SON Ltd.

Printed with
JOHNSTONE CUMBERS & SONS INKS

"Charme Délicieux."

Block by
The Clarke Engraving Co Ltd

Photograph by
A V Kenah

Kast & W'bo[illegible]s Duplex Sep a Ink No 77268

The Legal Fare.

Block by
Dansk Reproduktionsanstalt

From a Lead Pencil Sketch of
Frants Henningsen

Water-Sellers, Cairo.

L ne Etching on Zinc by
John Swain & Son Ltd

Young Vienna.

Copper Engraving by
Angerer & Göschl, Vienna.

Photograph by
Mertens, Mai & Co., Vienna.

Mending the Nets.

Three Colour Blocks by
Ashworth & Meredith

THE ART OF OVERLAYING.

MASTER CLIFF

Block by BURNETT & LADYMAN — Photograph by REINHOLD THIELE

EVER since the advent of half-tone, printers have found it necessary to change their methods of "making ready engravings," and while in "ye olden times" a soft rubber blanket was stretched on the cylinder and a few impressions taken, a few patch up sheets put on the cylinder, the forme was considered ready to run, it has long been acknowledged that the making ready of a forme filled with fine half-tone engravings for magazine or catalogue printing or for tri-colour or chromatic printing requires the greatest skill, and is connected with much expense.

During the advancement of wood-engraving it was already found that the ordinary make-ready used then would not suffice to hold out on an edition run to maintain the beautiful contrasts and tones so masterfully introduced into wood-engraving, which latter was quickly advanced under such highly-trained engravers as Lintoo, Dalziel, Taylor, Cole, Brendamour, Nast, and so forth, to a special art.

The story has it that an ingenious Scotchman on this side, or a skilled American pressman on the other side of the "Herring Pond"—where the Harper Bros., the Appletons', Frank Leslie's and the Century people were in rivalry for the highest achievements in wood-engraving, spending tons of money for the best equipment in printing presses, and paying $30 to $50 per week to control the most expert cut printers—thought out and applied in practice, what is termed in printers' language still to-day, the "hand-cut overlay" The aim of this idea was to reinforce the various shades proportionately to their value of colour by cutting out layers of paper representing the various shades which then were pasted together and formed a sort of graduated relief, in which the blacks were heaviest and the lights lowest, and which, therefore, either increased or relieved the pressure upon a cut during the process of printing.

The invention of this ingenious and useful device improved the results of printing high-class engravings vastly, and printers were enabled by its use to

develop their skill in doing justice to the effects of the artist's proof from that time on.

There was, and there is still to-day more in that invention of the overlay, as printers call it, than what may be anticipated at a first glance, or what is even admitted by many to-day. For instance, the now lost art of wood-engraving could never have fascinated the connoisseur or the masses, and probably would have never developed into an art cherished by thousands and hundreds of thousands all over the globe, had it not been for the printers, who, after severe struggles, conquered by means of the overlay difficulties which, under the old methods, barred them from the very goal of their efforts—the production and preservation of the effects of the artist's proof during an edition run of illustrated work.

It is regrettable that the artisan's name, who first introduced the ingenious idea of the making of a hand-cut overlay, has been lost in the deep channels of passing time, for it not only represents a crowning achievement, but marks a new period of evolution within the printing industry, namely, the development of a special and well-paying branch of cut printing.

But while wood-engraving was at the zenith of its success, reproductive art direct from nature, had become possible, and was developed through photography to such an extent that it commenced to make itself felt in no mean degree, and the enormously high cost, and slow and tedious process of producing high-class wood-engravings, undoubtedly encouraged photo-scientists to experiment in a direction by which it became possible to replace box-wood by metal, and the graver by the judicial use of acid. Soon thereafter appeared illustrations printed from engravings which were produced by the now well-known process of photo-engraving. At first, the aim of this process was limited to replacing the wood-cut, but also led directly to the introduction of some very beautiful line engraving illustrations Afterwards, through the opening up of this new field, a photo technique came into vogue, and conquered a place for itself, and the desire for further improvement fed by the advancement in photography, led ultimately to direct photo reproduction of the style known as photogravure by intaglio etching, and to relief gravure, or the so-called, and by this time well-known, half-tone engraving.

The latter, it seems, especially was destined to replace wood-engraving, and force it into the position of a lost art, which in a measure is much to be regretted. However, the invention of half-tone has done wonders for the education and enjoyment of the masses, for it produces exquisite direct results from nature, which, firstly, are unobtainable in wood-engraving, and secondly, at an almost incomprehensibly low cost in proportion. Besides the quickness and cheapness of these productions have increased the use of illustrations by publishers of illustrated works, weeklies, magazines and even daily papers, as is a well-known fact, most enormously, and since the adaptation of the new method I would point out that illustrated printing has bounded forward to a degree so as to present an art industry by itself.

But to do justice to the printing of the great number of beautiful engravings now appearing in the magazines, press-rooms had to be re-modelled and stocked with new and ingenious devices of machinery, and the methods of making ready cut formes necessarily also underwent considerable changes. A strong want made itself felt to secure and adapt an overlay in place of the hand-cut overlay, which not only could be produced more quickly, but which could also do justice to the enormous amount of fine detail now contained in the cuts since photography came into play It is generally well understood to-day, that no overlay cutter

of the wood-cut school, be he ever so skilled, can do full justice to a photographic cut or a half-tone, even if he would spend an unproportionately large amount of time on it. But just for that reason the real beauty of the subject of such a cut (which is accentuated by its subtle tints and refined detail) is diminished or loses in effect.

The want of a new overlay evidently did not ripen in the mind of any one individual, for on looking back we recognise that a universal demand must have made itself felt all over the civilized world where half-tone printing was going on. One can go back 15 years and find that just about that time, experiments to produce a photographic overlay which, by its element of direct production, would or should possess all the detail contained in a cut, were going on simultaneously in different parts of America as well as in Europe. Early experimenters to produce overlays on the photographic principle were—Pustet, a printer of Salzburg, in the Tyrolese Mountains, Dr. Husnik, of Husnik and Hausler, of Prague in Bohemia, and W. Kurtz in New York. The gentlemen mentioned experimented to produce a direct photographic overlay by the use of bichromated gelatine, applying the well-known wash-out process. It must be borne in mind that with the exception of Pustet, who was a printer, the other gentlemen mentioned were engravers, and they, having the reproduction negatives of the engravings on hand, made exposures on a bichromated gelatine film, dissolved away all soluble portions of the gelatine in warm water, and obtained thereby a graduated relief in which the solids or blacks of an engraving would appear to be highest, the high-lights lowest, and the intermediate shades or tints of proportionately graduated height in accordance with their relative strength, lying between the high-lights and the solids. This carried out, indeed, the principle of an ideal overlay based upon the proportionately graduated relief in which are represented the shades, tints and lights of an engraving in proportionately graduated lights.

But there were difficulties in the way of the general adoption of this overlay by the printing industry. Of Pustet, the printer, it is known that he, after experimenting awhile, abandoned the process as being unsatisfactory, and there is no doubt that it was for him, as a printer, particularly difficult to overcome the absolutely necessary medium of a negative for making an overlay direct, as the reproduction negative can, in most cases, not be obtained any more by the time the cut reaches the printer, and to produce a perfect mechanical negative for all classes of cuts which reach a printing office in the ordinary course of business is not only a costly proceeding, but not within the sphere of a printer. Overlays, however, should under all conditions be made on the premises of the printery, and by practical printers who can judge prevailing conditions and produce the overlays in accordance with the often and much varying requirements.

Dr. Husnik, as well as Mr. W. Kurtz, however, as mentioned before, were engravers. Mr. W. Kurtz abandoned this gelatine process after a short time, and Dr. Husnik, who gave the subject, as is claimed, a great deal of study, produced some good overlays. But the gelatine overlay did not introduce itself generally, although strong efforts were made on the Continent as well as in Great Britain, and to-day, if I am correctly informed, it is hardly used in any printing office. The reasons for the "why" were many. First of all a negative is required which, as a general thing, cannot be obtained by the printer. To produce the negative by a special mechanical process is tedious, and adds materially to the expense, and this obstacle alone shuts the printer out from making his own overlays on his premises. Then negatives are but rarely perfect, and in the ordinary progress of making engravings these defects are corrected on the zinc or copper by the etcher or finisher, who works the plate up to bring it as near the

the main difficulties being that the graphite crumbled and worked out from between the tympan, whence it would fall on the face of the forme, and deface the cuts. Dittmann, for some reason or other, however, separated from the combination with his friend, and got up another powder overlay much on the same principle, but used different material. Instead of using a thin sheet of paper for his new overlay, he employed a fairly heavy, well-finished Manilla bottom sheet. He made his impression with a specially prepared adhesive ink, powdered it in with wheat flour, varnished and baked it in a gas oven, and varnished it afterwards again. At first he advocated the use of more than one layer, but after a while he proposed to use only one sheet, and differed radically from the previous methods by advocating to varnish and bake it, and to make another impression on the top of the first, and by repeating a second, or even a third time, the same proceeding, evidently intended to build up and produce when complete a homogeneous overlay. He had his idea patented, and sold his United States patent, it is said, for $15,000 to the Dittmann Overlay Co.

The process was quite in vogue for a time in the United States, until its disadvantages came to light, and it was found that it was an insufficient method. Attempts were made to introduce these processes, as well as Husnik's gelatine overlays into Great Britain, but apparently with no real practical or lasting result.

Then came a German invention, the so-called Dethleff process, which is merely an imitation of the Dittmann method, the difference being that instead of wheat flour or graphite, shellac and gutta-percha were dissolved in ether, dried and crushed to powder, which then formed the material for the dusting on of the overlay. If anything, this method makes the application more difficult, and the results are no better.

The Faults of the Powder Overlay Systems.

The powder overlay systems, it has been found, present, in the main, the following faults, viz. :—

(1) A proof taken with a medium amount of ink will produce an insufficient relief, because the ink cannot absorb enough powder.

(2) Should a plate be rolled up heavier, then the fine detail in the solids and medium tints will fill and close up entirely during the baking process. The same imperfections occur naturally and more readily if a second impression will be applied to the first relief, or if several dusted-on proofs would be pasted together.

(3) It is impossible to build up a sufficiently high homogeneous relief without a considerable loss of the fine detail, and a lot of hand work attached to scrape out and uphold the detail.

(4) Experience has proved that the use of powder in the construction of an overlay will result in fatalities on the press, inasmuch as the powder is apt to crumble after a comparatively short time, destroying thereby the effect it should produce, and under conditions may lead even to the defacing of the cuts.

No material gain was produced against a good hand-cut overlay either in quality or in quantity, and the improvements offered by all these processes, therefore, proved insufficient and unreliable.

Amongst other minor attempts to produce a mechanical overlay to replace the hand-cut overlay, we have to record the metal overlays which trace their origin to America, England and Germany. In America they produce a low electro shell, in Germany and here in England a very thin zinc or aluminium plate, and after exposing same under the reproduction negative, etch it deep, and then use it to take the place of an overlay. Both methods have no future

as, aside from their questionable qualities, they are restricted by their own limitations, which are found in the cost and the skill and appliances required for their production.

In the States, however, the idea of producing a first-class mechanical overlay had gradually taken thoroughly hold amongst the representatives of the art, while the direct gelatine overlay, the powder and metal overlays did not solve the question, they prepared a stimulant for renewed activity towards further ingenious development.

Researches were made, and the subject how to reach the object in view and make an overlay which will be produced on the printer's premises, and would serve *all requirements*, was often the topic amongst printers of note and standing. The fact that the photographic half-tone reproductions and their enormous detail demanded an overlay produced by means of photography to do justice to them on the press was generally acknowledged, but no one knew just how to approach the practical solution. Gelatine seemed to offer the only possibilities, but then we had the experience, and it seemed out of the question to start the solution of the problem with this material again. Gelatine in its application to photography, however, possesses so many intrinsic qualities that the photo-technique could have hardly reached its present high perfection without it, and finally, the matter of the photo-mechanical overlay was taken up again by experimenting with gelatine, but the method employed assigned to gelatine only a part of the evolution in the process to be finally adopted, which, as we will see further on, led to most encouraging results.

It was for years back commonly known that bichromated gelatine, if exposed to light under a negative, would become insoluble in all unprotected portions, and partially insoluble in partially protected portions, and that it would retain its natural state wherever it was entirely protected. In other words, the protected solid blacks of a positive exposure, for instance, would retain their natural state, and all shades and intermediate tints down to the high-lights would become partially or totally insoluble in exact harmony and proportion with the image of a negative or positive used for the purpose. When immersed in water the picture photographically printed upon the gelatine will absorb the water in all portions where the light has not, or has only partially, acted, whereas the entirely or partially exposed portions would remain entirely or partially insoluble and absorb no—or only a small amount of—water. In effect, this means that if such a picture printed by means of photography on bichromated gelatine be immersed in cold water for some time, it will swell up and produce a proportionately graduated relief in gelatine, in which the highest lights lie deepest, the solids and darkest parts and all intermediate tones and tints lie proportionately higher. Such a relief can be allowed to swell to any desired practical height, and while it cannot be used as an overlay it can be formed off in plaster, giving the original gelatine relief in the exact reverse. From such a plaster cast, which retains but reverses the minutest detail of the original gelatine matrix, a gutta-percha relief can be pressed off under the application of heat and gentle pressure, the gutta-percha adjusting itself under the operation to all the details contained in the plaster mould, and so practically producing a moulded relief photograph in gutta-percha.

This method includes in its practical application a number of advantages specially designed and selected by the inventors only after careful thought and study of the real properties required to make a mechanical overlay which would be simple in its production and universally useful in its practical application for and by the printer, introducing, at the same time, novel and heretofore unknown

possibilities in the production and use of overlays at the disposal of the printing industry, and overcoming most effectually all the difficulties experienced with the old processes.

The process is started with a positive, not merely by accident, but with a specific intent of purpose. A positive, or a diapositive as it might justly be called, is used to begin with to overcome all the difficulties and defects inherent to the negative, and to place any practical printers who can make a decent proof in a position to produce a positive without the use of a camera, yet containing all properties found in a cut simply by taking a careful proof from the finished engraving. This proof is intensified by carbon black, and can be produced in any printing office in ten minutes; it is then immediately used for the transposition of the picture on a bichromated gelatine film in a photographic printing frame. After sufficient exposure the gelatine film is merely put in cold water and left there until all portions of the picture which were wholly or partially protected during the exposure will swell up without assistance of any kind, and form automatically a perfect proportionately graduated relief which can be allowed to rise to any desired practical height, *thereby regulating at will the thickness of the overlay* required. By a simple procedure a plaster cast is taken, not merely to add another operation to the process, but for the *express purpose of producing a true and permanent mould* from which one or *any number of duplicate overlays* can be quickly produced at any time—in 7 to 10 minutes—being absolutely of the same *even and perfect* quality.

The gutta-percha itself is a guarantee against the influences of dry or wet weather conditions, and effectually overcomes the difficulties experienced by the use of the gelatine overlays. But besides this important quality, it possesses an additional advantage of no mean importance for the printer, namely, that it neither crumbles, cracks nor *wears* in the slightest, and never requires to be replaced; as many as one million impressions have been taken from these overlays without their showing the slightest deterioration at the finish of the run.

This is due to the slight resiliency contained in first-class gutta-percha, and that lays bare the reason why engravings, originals, electros or stereos show practically no wear after a run of from two to three hundred thousand impressions, whereas by the use of the paper, gelatine or powder or metal methods, the overlays and the plates are worn out unduly. In consequence of this resiliency the overlay also safeguards against cuts, "punching through" the paper, and no heavy impression can be noticed on the back of printed sheets, which so often spoils the beauty of illustrations. Still another welcome feature is that it can easily be manipulated, which is, especially for vignetted overlays, of the greatest importance. It can be produced quickly and surely, and at all times of the day or night. It does not depend upon expert men, photographers, etchers and the like, but any ordinarily intelligent printer can conquer the process during two weeks' teaching, and in a number of establishments from 100 to 300 overlays are daily produced by a few hands. Its introduction has become general, the largest houses in London having taken it up, and overlays are being made and sold from here all over Great Britain It is not only used on flat-bed machinery, but is the only mechanical overlay which is successfully used on rotary printing machines, and it works well even if applied under a heavy blanket. The press work when finished, looks softer, clearer and brighter, and the plastic appearance of the illustration shows clearly the effects of the graduated relief applied.

The first installation of the process into London printing offices was made by Mr. John Spottiswoode, for Spottiswoode & Co., Limited, and houses like Messrs. Eyre and Spottiswoode, H.M. the King's printers, the Amalgamated Press, Limited,

Richard Clay & Sons, Limited, The Press Printers, Limited, The Temple Press, Limited, The Christian Herald, John Swain & Son Limited, and many others have adopted the system, and produce their overlays on their premises, thereby assuring to themselves the greatest economy and benefit obtainable. The saving in making these overlays against the old method is from 33⅓ per cent. to 50 per cent., and a further saving of 25 per cent. to 50 per cent. is had on the press in making ready cut formes.

The invention of this most important process is due to Mr. Edward Bierstadt, the well-known collotype printer, and photo-chemist and Mr. Theo. B. De Vinne, of the De Vinne Press (Theo. L. De Vinne & Co), New York.

Mr. Paul Pfizenmayer of the same city who brought the process to Europe has made a number of practical modifications during his years of experience with the process, and it is due to his untiring zeal that the De Vinne-Bierstadt overlay, as he calls it, has found entry into many of the most noted printing houses in Great Britain and on the Continent of Europe. The present British and European offices of the De Vinne-Bierstadt overlay are located at 78 to 81, Fetter Lane, where any information may be obtained on all overlay matters.

The following is a list of the principal publications which are at present continuously and exclusively printed with the De Vinne-Bierstadt overlay :—

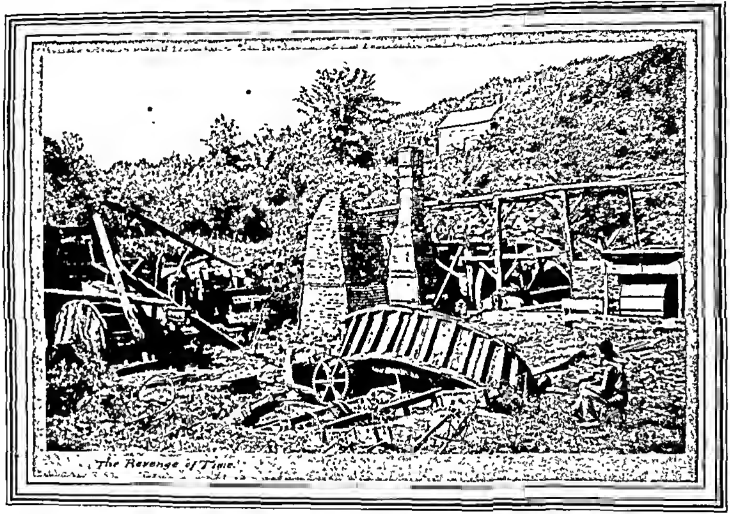
American Publications.

"The Century Magazine," and all the Century Co.'s Publications	
"Strand Magazine" (American Edition)	
"World's Work"	40,000 copies
"Country Life in America"	70,000 "
"Ladies' Home Journal"	35,000 "
"Saturday Evening Post," weekly	over 1,250,000 "
"Art de la Mode"	500,000 "
"Toilette"	30,000 "
"Physical Culture," English and American editions	30,000 "
"Beauty and Health"	100 000 "
	65 000 "

and many others

British Publications

"The Sphere"
"The Car"
"Lady's Pictorial
"The Tatler"
"Sporting and Dramatic News."
"Gentlewoman"
"The Motor."
"Architectural Review"
"The Cyclist"
"The Marvel"
"Heartsease Library"
"The Comic Home Journal"
"Sunday Stories"
"Forget Me-Not"
"The Union Jack"
"Home Circle"
"Penny Pictorial Magazine"
"Pluck Library"
"The Treasury"
"Burlington Magazine"
"Kelway's Manual"
"Christian Herald."
"Comic Cuts."
"Home Chat"
"Home Companion"
"Horner's Stories."
"The Boys' Friend"
"The Girls' Friend."
"The Sunday Circle."
"Chips."
"Horner's Pocket Library."
"Sunday Companion"
"Golden Circle"
"The Wonder"
"The Boys' Realm."
"Boys' Own Paper."
"Ironmonger"
"Chemist and Druggist."
"Herald Magazine."
Etc., etc.



The Revenge of Time.

"My task is done—my song hath ceased—my theme
Has died into an echo"

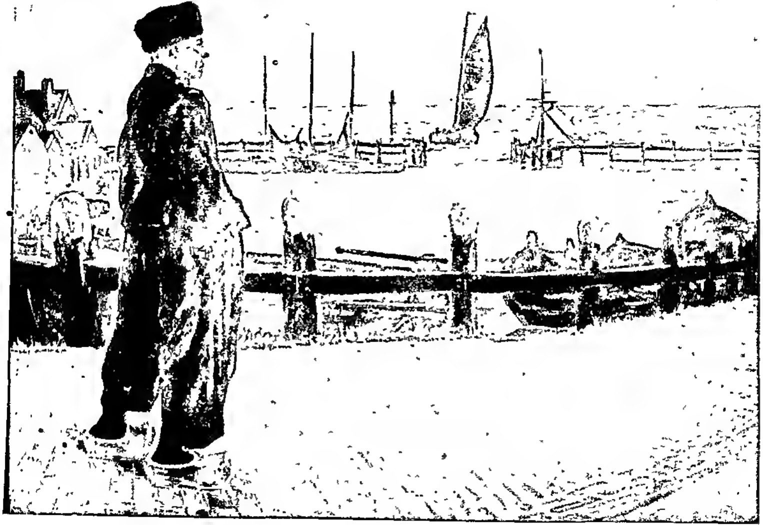
Plate lined on
Royle's Lining Beveller,

ph by

From the Sunny South.

Block by
The [illegible] Engraving Co. New York

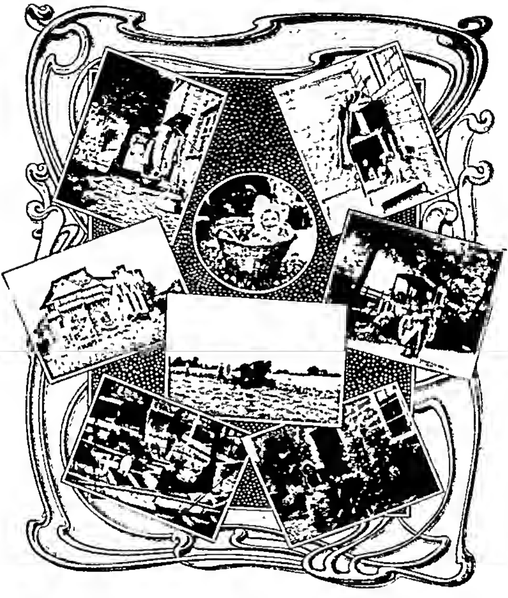
Photograph by
Byrne & Co.



A Zuider Zee Port.

Block by
W C Keene

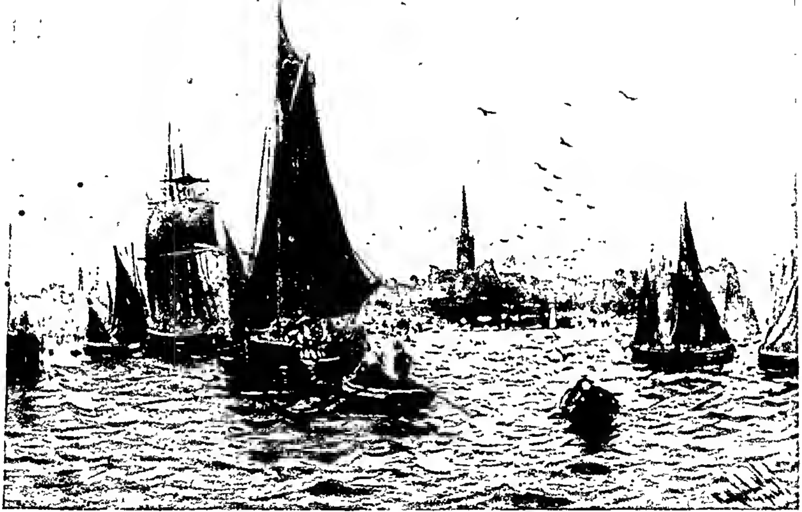
Direct from Oil Painting by
Gerald S Davies



Summer Snap-Shots,

Block by
The Clarke Engraving Co. Ltd

Photograph by
H. Allen George



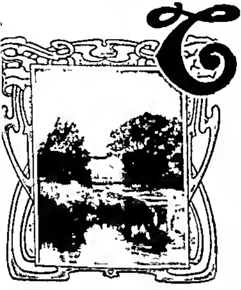
Breydon Water, Norfolk.

Three Colour Blocks
(Direct Collodion Emulsion Process)
by The Anglo Engraving Co Ltd

From a Painting by
Malcolm Lloyd

PHOTO-LITHOGRAPHY IN LINE.

By W. T. Wilkinson.



"Where Creeping Waters Ooze."

Block by British Photo-Engraving Co. Photograph by J. C. Phythian.

THE Negative is the all-important factor in the production of a good photo-lithographic transfer. The lines must be clear, bright, and free from deposit, the whites being represented by as near opacity as possible—absolute opacity is not required, but the lines must be clear. These negatives may be made by the wet collodion process (cheapest, best and quickest when electric light is available), with collodio-bromide emulsion, or upon "Process" dry plates. With wet collodion for ordinary open line work, the lead intensifier, followed by sodium sulphide, will give good negatives, but for very fine lines, after the negative is fixed, intensify with copper bromide, followed by solution of silver nitrate, then clear the lines by means of iodine, and iodide of potassium, followed by cyanide of potassium, then intensify with lead and sodium sulphide. This method is also essential with collodio-bromide emulsion, which once grasped is a very easily worked process.

With "Process" dry plates a full exposure is requisite followed by a full time in the developer, then after fixing, clear the lines with a mixture of hypo and ferricyanide (Mr. Howard Farmer's reducer), wash and intensify with mercury bichloride, followed by ammonia, or caustic soda, or potash; negatives that will not intensify sufficiently with the above should be thrown away, and fresh ones made.

This clearing the lines, no matter which process be used, is necessary in order to remove the action of white light reflected from the lines in the original.

A glance at Figs. 1 and 2 will convince. Fig. 1 is a micro enlargement of a negative before clearing, and Fig. 2 after clearing. In Fig. 1 the line is more or less clogged up, whilst in Fig. 2 the silver granules have been removed, leaving a clear-cut line.

Care must be taken not to overdo this clearing, or the result will be that the lines in transfer will be thickened, and that would be objectionable.

The Transfer. All paper stretches when wetted, and that not equally, *i.e.*, the stretch is greater in one dimension than in the other, therefore the gelatinized photo-lithographic transfer paper must be dried upon glass after being soaked in the sensitizing solution; it will then dry at its highest tension, in that condition it is exposed under the negative, and in the damping hook readily returns to the same dimensions.

Another advantage of drying the gelatine surface in contact with glass, is the fact that it is kept from the influence of deleterious atmospheric conditions which is impossible when the paper is hung up to dry; when dried upon glass the gelatine is quite soluble, and readily absorbs water, so that the ink on the whites readily

clear up, but when dried in the air, the surface is partially insoluble, then the ink will not wash away so thoroughly as it ought, and the whites are contaminated with grease.

Paper specially prepared for photo-lithography is only made in small sizes; for large work, double transfer paper, as used in the carbon process, such as Monckhoven's, Autotype, etc., can be recommended. Double transfer paper may be sensitized in:—

Potassium bichromate	5 ounces.
White of egg*	5 ounces.
Water	80 ounces.
Citric acid	1 dram.

* Or Dried albumen, ½ ounce.

Dried albumen is difficult to dissolve in water, on account of its dryness, but if mixed with an equal bulk of dry pumice powder, it dissolves easily, the pumice powder being filtered out. Filter the sensitizing solution before use.

Fig 1

Fig 2.

The glass plates upon which the transfer paper is to be dried after sensitizing must be thoroughly clean, and have a final polish with French chalk (steatite). The paper must remain in the bath until thoroughly limp, it is then squeegeed gently upon the glass, and the back wiped with a swab of swansdown.

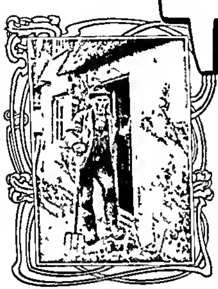
No special precautions are needed in drying except that it must be done in a warm room, and in non-actinic light.

Printing under the negative should be carried until the image is strong, and with thin negatives until the whites are *just* tinted. Always examine the print in the frame in a dull light, and let the examination be as brief as possible; the best guide to exposure is to have a quarter-plate line negative, with a strip of sensitive gelatine paper under it.

Inking up the transfer must be done on one of my inking boards, using photo-litho transfer ink, thinned with turpentine, and a good soft glue roller—the use of a leather roller, and the old method of an inked stone and a pull through the press have spoilt many a good transfer. In inking up, keep the ink thin; do not obliterate the picture, a thinly inked transfer will give far better results than will a heavily inked one.

ETCHING COLLOTYPE ON METAL.

By AN OLD HAND.



WHEN THE DAY'S WORK IS DONE.

Block by Vaus & Crampton, Ltd. Photograph by P. R. Salmon.

TWO or three years ago the writer had an opportunity of examining a few specimens of irregular grain zincos which were very fine, having more the appearance and character of collotype prints than any zincos which he had previously seen. By favour, a full account of the process was obtained, and as it offers an opening for experimental work to those so inclined, he begs to offer an outline of the process to the readers of the PROCESS ANNUAL. The basis of the process lies in the etching of what is practically an inked-up collotype print made on grained zinc by the cold enamel process.

The sensitizing solution is made as follows—in quantity.—To 50 oz. of distilled water add 20 or 30 drops of a saturated solution of chrome alum, and in the above thoroughly soak for a few hours 4½ ounces of any good, middle-hard collotype gelatine, then dissolve by heat in a digest bath, and sensitize by adding 2 drams pure bichromate of potassium and 3 drams Merck's bichromate of ammonia, stirring with a glass rod until the whole of the chromates are thoroughly dissolved. Now lay aside after careful filtering until the whole sets into a fine jelly—in which state it ought to be allowed to remain for a few hours in the dark-room to ripen. Now take a piece of zinc of the size required, thoroughly polish with a clean rag, putty powder and two or three drops of ammonia. Wash well and place in a bath of nitric acid 1 part to 40 or 50 of water. Rock until uniformly grey all over. Take out and wash clean, rubbing with a tuft of absorbent cotton. Have a sufficient quantity of chromated jelly dissolved and filtered in a measure glass. Flow over the zinc plate with sufficient to cover and allow the surplus to drain off to waste; repeat, and then coat the plate. When all the water has been got rid of, place in drying oven, raising the temperature to about 130°.

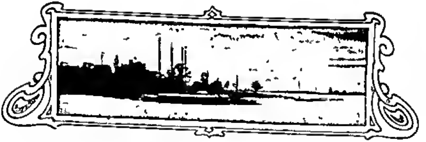
When dry the plate is printed in the same way as a collotype, with actinometer as a guide, and when printed soaked in water until all the soluble chromate is dissolved out of the film, then laid on edge and allowed to dry. When dry the film is to be damped with a solution of glycerine 1 part, water 2 parts, and a few grains of chloride (salt) of sodium to each ounce. Allow this to remain for quarter of an hour, after which the plate has to be inked up as for collotype, but with hard etching ink thinned with thick litho varnish. When

properly inked lay aside to harden for a considerable time, then etch with the following formula :—

Perchloride of iron....................	5 ounces.
Chloride of zinc	4 drams.
Meth. spirit	83 ounces.
Nitric acid	5 drams.

Etch for 15 minutes, then add 5 drams more nitric acid and continue adding 5 drams each quarter of an hour. The time of etching may vary according to the thickness of the film or hardness of zinc, but the time of etching will generally be about one hour. The strength of etching solution will generally stand about 40° Beaumé, or can be made up to that strength.

The above methods might be used in conjunction with a print to metal from a positive image in the production of collo-gravure plates with success.



SUNSET ON OULTON BROAD

Block by
VAUS & CRAMPTON LTD

Photograph by
JEFFREY BROCKING

Whitby Abbey.

Block by
Photochrom Co.

Photograph by
Carl Norman

Portrait Study.

Block by
Ashworth & Meredith

Photograph by
S. J. Beckett

Dog and Boar.

Block by
Chappelow & Co

From a Lithotint by
Fredk. Taylor, 1844

The Penguin at the Zoo.

Block by
The Art Reproduction Co. Ltd

Photograph by
F. T. Corbett

The Prince of Wales lights a cigarette.

From a Photograph

Republished in the "Process Year Book" by the courtesy of the Proprietors of "Pearson's Magazine."

HE-HEE-HEE

From the Painting by
John Hassall R.I.

Republished in the "Process Year Book" by the courtesy of the proprietors of "Pearson's Magazine."

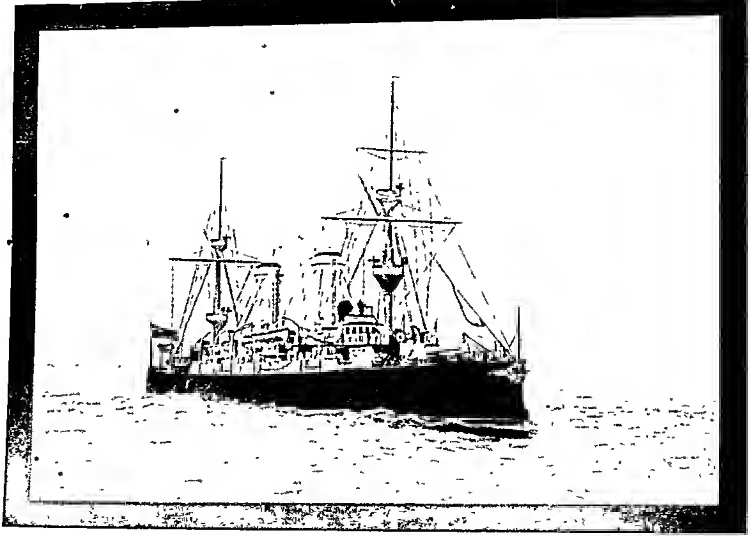
Boo-Hoo-Hoo

By kind permission of the owner of the Copyright Peter Keary Esq

From the Painting by John Hassall R.I.

Republished in the "Process Year Book" by the courtesy of the Proprietors of "Pearson's Magazine."

"We were rapidly overtaking old Mr. Baboonodon, and



A Trial Spin.

Block by
The Exemplar Engraving Co

Photograph by
J. E. Goold

Feeding the Pigeons.

Block by
The Arc Engraving Co Ltd
(Ordinary Half Tone)

By kind permission of
Black and White

Feeding the Pigeons.

Block by
The Arc Engraving Co. Ltd.
(Retouched by Hand Engraving.)

By kind permission of
Black and White.

Woodland Dell, Marple, River Goyt.

Block by
The Premier Engraving Co

Photograph by
William P. Thomson

A FEW WORDS ON DRY PLATES FOR SCREEN NEGATIVES.

By H. Hands.

THE LITTLE HOUSEWIFE

Block by CARL HENTSCHEL LTD — Photograph by CATHERINE EDMONDS

I UNDERSTAND that several firms in England use dry plates for H. T. screen negative-making, but I have never yet seen anything in print concerning the details of their use—that is, at least, by a professional user of such plates. Hence this contribution may prove not unwelcome to our good editor. I have been a regular user of dry plates (process) since their introduction; in fact, owing to the tribulations of the "bath" in India I used, in the beginning of my "process" life, transparency plates as being preferable, with all their drawbacks, to the former.

Judging from the occasional references I have seen in the technical journals it seems to be the general opinion that it is difficult with dry plates to get sharp dots. My experience is that *absolute* sharpness is impossible, but sufficient sharpness for practical purposes, even for the fish-glue print, is easy enough to obtain. To test this point I am sending the editor a negative which gives, practically, a facsimile reproduction of the original, and he may see his way to have a block made from it by the fish-glue method, and also add his opinion of the negative from a technical point of view. The leading principles appear to me to be —

(1) Plate backed with absolutely opaque pigment (I use lamp black and red ochre rubbed down in gum water, and thinned to consistency of thick cream with methylated spirit).

(2) Sharpest possible focussing of image.

(3) Screen as close to plate as the considerations of securing detail and avoidance of *screeniness* will allow.

(4) Just sufficient exposure to give the necessary strength of dot and spreading action and not a moment longer.

(5) Development with full-strength developer, to which has been added double the usual amount of bromide used for ordinary work.

(6) Fixation in fresh Hypo, two baths.

(7) Cutting down in a *strong* solution of ferricyanide of potash.

There are good reasons for each and all of these recommendations, but it is obviously out of the question to take up space in this annual in setting them forth. I may, however, help out some of the points. The dot should be focussed

STUDY OF A WOMAN SEWING

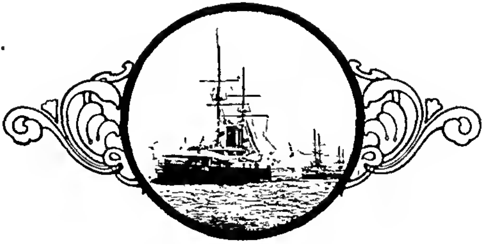
Oh, men with mothers and wives,
Oh men with sisters dear
It is not linen you are wearing out
But human creatures lives.

Block Etched on Zinc
(See article on preceding page.)

Photograph and Half Tone Screen
Negative by H. HANDS.

and not set by "tables." The shape of the dots in the high-lights (as seen by a magnifier) that gives the best possible results can only be recognised and impressed on the mind by intelligent practice. No explanation would convey the idea to the beginner, and I will not insult the old hand. It is obvious that exposure beyond that just necessary to secure the proper effect is aggravating the tendency of the edges *to spread in the film*. A strong developer, with the additional bromide as stated, finishes the plate in a minimum of time and tends to obviate spreading in the film. It also reduces a maximum of silver, which enables the deposit to withstand a strong reducer. A *strong* reducer cuts away the edges of the dots with a minimum of action on the dense centre *when the cutting is carried out as follows*. The plate remains in the second hypo bath for as long a time as it took to fix out (apparently) the unaltered bromide in the first bath. Removing it from the hypo it is *dipped* into a dish of clean water to remove the hypo from the *surface* of the plate only. It is then flowed (in a white dish, preferably) with the ferricyanide solution (I use 1 dram of a 25 per cent. solution to each ounce of water) for 5 to 10 seconds, removed rapidly and plunged into water *keeping the plate moving*. Rinse for a minute, examine the plate, place it in the hypo and repeat the foregoing until the desired effect is obtained I find that few plates need intensification, and then only when the joining-up is weak. After this rinse the plate in a few changes; then suspend face down in a deep dish for 10 minutes. Flow with a weak solution of sulphuric acid (2 per cent), rinse for a minute and set up plate to dry. For intensification, when necessary, I prefer Monckhoven's formula.

[The negative referred to in this article although thin in appearance had the requisite quality of dot. It was handed to a London photo engraving firm who printed it by the enamel process on zinc and found no *difficulty in etching it, as the result on preceding page shows.—ED., P.Y.B.*]



THE WARSHIPS LONDON, HANNIBAL AND JUPITER

Block by

Photograph by
WEST & SONS

NOVEMBER SNAPSHOTS: HOW I DEVELOPED THEM.

By AN OLD HAND.

OPENING OF THE CARNEGIE FREE LIBRARY AT PITTENCRIEFF GLEN

Block by T. B. BROWNE LTD.

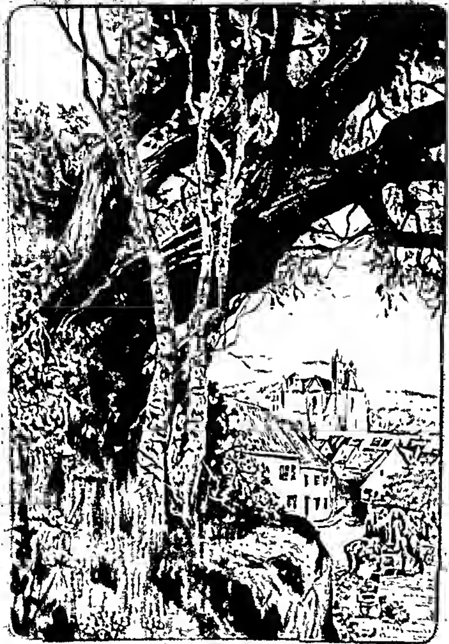
My wife received an invitation, along with a few friends, to view the opening ceremony at Pittencrieff Glen on 21st November, 1903. The estate and glen were purchased by Dr. Andrew Carnegie, and presented to the town of Dunfermline with an endowment of some £500,000, the interest of which is to be spent in providing entertainment for the public and on the estate. Being anxious to take a hand camera with her in the hope that a memento of the occasion might be obtained, I filled up one of Lizars' Focussing Magazine Cameras, fitted with Beck Symmetrical Lens and Bausch and Lomb Shutter, Imperial Special Rapid Plates, set the shutter at 1-25th of a second, and diaphragm between f/11 and f/16. On seeing the dull, leaden atmosphere that morning we felt that to obtain a negative of any kind would be hopeless. Many amateurs were observed there, also professional bioscope operators, and I was told their films were a total failure. On showing them a few days later the results obtained, they simply marvelled, and I have not heard of any other negative or film taken on that day being printable.

Five exposures were made, and the question came to be what developer to use to get a printable negative. Eventually it was decided to use the Imperial Standard Pyro-Metol developer as being the most likely one to use with their plates. However, after 35 or 40 minutes' patient development, there being no trace of an image, the developer was poured off, the plate then flooded with water, and the dish covered—and a few minutes taken to think what would be best to try next. Two or three ounces of fresh developer were made up in one graduate and in another measure one and a half ounces of 10 per cent. solution of sulphite of soda and 5 to 8 grains of dianol thoroughly dissolved in it.

The two developers were now mixed together and another trial made; in little over a minute the high-lights began to appear, and in from 6 to 10 minutes the plate was developed.

The same developer was used for all the remaining plates, developed in pairs, and gave good, printable negatives with about 10 minutes' development. I have selected the entrance to the glen as an illustration to this article; the others, being groups, are of no general interest.

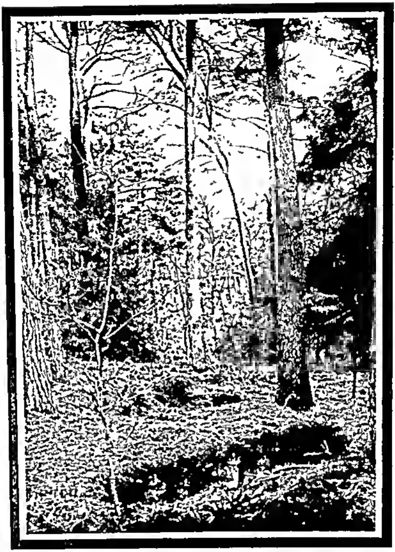
None of the exposures were made before 4 p.m., and it is certain that but for the addition of dianol they would have been useless. This developing agent is best used in conjunction with pyro for cases of under-exposure, the combination giving a more satisfactory image to print from than when dianol is used alone.



ENGRAVING CO LTD

A Pastoral View

WARNER



Talbot Woods, Bournemouth.

Block by
The Exemplar Engraving Co

Photograph by
Martin J. Ridley

Block by
The Press Etching Co

"La Cigarette."

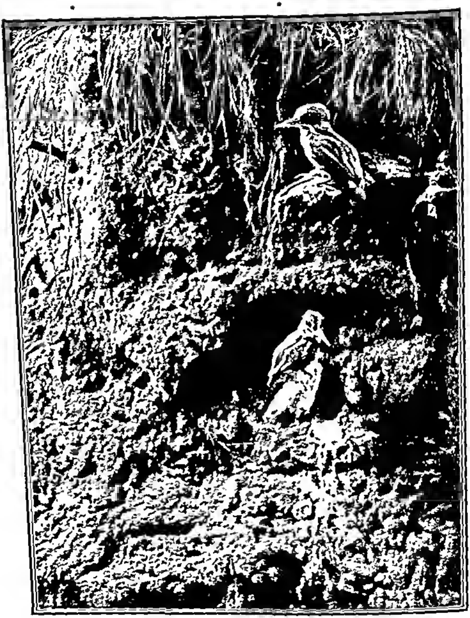
Photograph by
Rheinold Thiele.

Studio of W. Parkinson, Esq.

Statuette in foreground is Mrs Parkinson's Exhibit at the Royal Academy, 1900.

Block by
H. Rheinlander & Co

Photograph by
F. W. Brookman.



The Kingfisher.

(Alcedo ispida.)

Photographed from the Case in Natural History Museum, South Kensington.

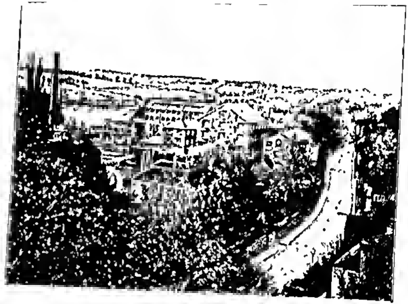
Block by
The Half Tone Engraving Co. Ltd.

Photograph by
F. T. Corkett

Evening.

Two Colour Print by
W & G Baird Ltd

From Orig nal Lent by
W M'Lean Esq. Belfast.



View of Hemel Hempstead.

Half Tone Key and Grained Colours for Four Printings by Walter Hay

By kind permission of John Dickinson & Co., Ltd

View on the South Coast.

Half Tone Key and
Stipple Colours for Four Printings
by Walter Hay

From Photograph by permission of
Frank Kimber

Old Shanklin.

400 line Half Tone by
Walker Engraving Co New York
Lines ruled on Royle's Lining Beveller

Photograph by
F. G. O. Stuart

Deep Down in a Cornish Tin Mine.

1. A "Stope."

2. The Cathedral.

Block by
The Press Etching Co.

Photograph by
J. C. Burrow.

Ringwood.

Block by
The Expert Engraving Co

Photograph by
F G O Stuart.

The Foot of the Falls, Niagara.

Block by
The Exempl[illegible] Engraving Co

Photograph by
F. T. Corbett

A Study in Colour.

Three Colour B[illegible]
The Strand Engra[illegible]

Ph[illegible]graph worked in Colour by
Ad[illegible] Lang[illegible]

LARGE WET COLLODION SCREEN NEGATIVES.

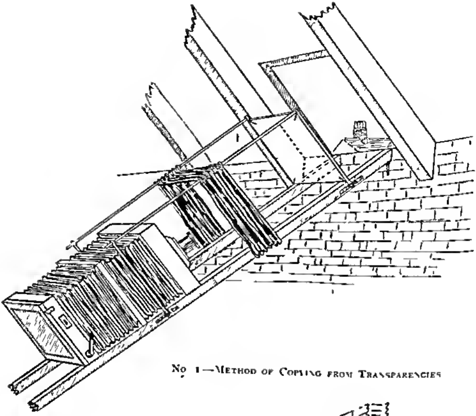
By BURMAN NORTON.

ONE TWO ——

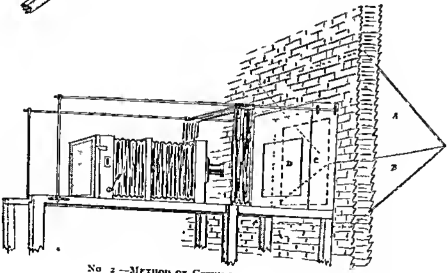
Block by A. BOLASS & Co. Photograph by BYRNE & Co.

LARGE collodion screen negatives being my contribution to the PENROSE'S ANNUAL for 1904-5—which gives all of us employed in letterpress illustration renewed enthusiasm for the ensuing year—although not a new subject, will, I hope, be interesting to my fellow operators, if only to know how some of their fellow craftsmen obtain their screen negatives under the different conditions, which have to be practical in the hustling half-tone process work of the present time. The screen negative being the keystone for the successful reproduction of the original, any practical method of making technically correct screen negatives is always interesting, even if my procedure of obtaining the desired end be not approved by my readers. The following method is practical, and if adopted will verify what I say, by the results of the operator's experience.

My method of making large screen negatives for the last few years has been by daylight, and I confine myself in this article to three-colour screen negatives, copied from transparencies. Paper prints take too long to make and stretch in mounting, especially large sizes, even if collodion papers are utilized, and registration troubles will follow on the press, so we will adhere to transparencies. The glass positives being made from the ortho dry plate negatives, by the wet plate process in camera by adjusting the colour negative in the carrier, which will ultimately hold the transparencies, the advantages of this method are obvious, as you have the opportunity of slightly enlarging from the negatives, say, for comparison, a negative 15×12, making 18×16 transparencies, or larger in proportion to the size of the original negative. By slightly enlarging from the dry plate colour negatives in this way your final screen negatives can be made any size between 15×12 and 18×16, saving the cost of the larger ortho plates, which are expensive, and the final combined colour result will be in every way satisfactory. There is nothing better than wet collodion transparencies to make screen negatives from, they are quickly exposed and dried off expeditiously by heat. Of course, if operators can get carbon transparencies made for



No 1.—Method of Copying from Transparencies



No 2.—Method of Copying from Transparencies
A—Ground Glass B—Mirror C—Plain Plate Glass D—Transparency

them, and save the bath getting greasy, all the better, as carbon transparencies are splendid to get technically good screen negatives from. I have not found them stretch in squeegeeing to the glass support. In making the screen negatives from the carbon positives, matters could be reversed *re* enlarging, by making the enlarged screen negative direct from the carbon transparency.

For making the transparencies in the camera, and the screen negatives from same, a special copying stand will be required, which must be made according to the conditions under which the operator has to work.

The best method is as sketch No. 1, taking the light direct from the sky, northern aspect if possible. By this means it is possible to get screen negatives in 1 to 4 minutes, and this allows the use of small stops, and does away with the annoyance of stains, which are apt to occur with longer exposures when working close up to margins of plate.

The second horizontal method of copying is as sketch No. 2, but exposures are longer. I have worked this way some time, conditions making it compulsory.

Adopting No. 2 method necessitates the use of a mirror 50×50 inches, to evenly illuminate a transparency 25×25 inches; this must be placed outside the building as in sketch B, at an angle of 45 degrees and a sheet of ground glass placed above (figure A) to shade the mirror, and diffuse the light. If the ground glass was not put on top the eave of the building would reflect a shadow on transparency, making it impossible to get the screen negative evenly exposed. There is another precaution to be taken, that is, the elimination of reflections which will occur and give false tone values in the screen negatives, unless the sheet of plain plate glass, to arrest these reflections, be placed in position as C, 4 inches behind D, which is the position for transparency, in exact parallelism to C, *plain glass.* If the precautions advocated are adopted this horizontal copying method is thoroughly practical, and I hope the detailed sketches will show clearly the idea which I wish to convey

There are a few manipulative details in the practice of making negatives in the sizes larger than 15×12 which are necessary to be borne in mind. We will take the two fundamental details first, *viz.*, negative glass, and collodion. The glass should be patent plate carefully albumenized, and of suitable thickness from $\frac{1}{8}$ in. to $\frac{3}{16}$ according to size The collodion must be thinned down to allow for evaporation. When coating a plate larger than 18×16 it is impossible to hold by corner or with pneumatic holder, so it is essential to have a rest of some sort to take the weight of the glass off the wrist I have found a large jar, with an engraver's sand bag laid on top of the mouth, answer the purpose admirably, the centre of the negative glass can be laid on and the collodion poured; it is necessary to flow twice to ensure a rich film Coat plate, rock and allow to set, when set coat again, rock and drain off at opposite corner, you will find on development an even negative which would not be obtained with one coating.

For sensitizing, a flat silver bath is most suitable, and should be rocked the whole time while sensitizing

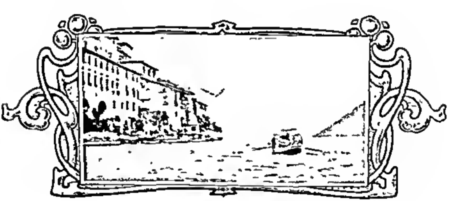
Developing larger sizes than 15×12, I find the following formula satisfactory. Iron 1 oz., acetic acid 1 oz., alcohol 1 oz, water 20 ozs. It allows more time for image to appear, and develops more evenly than the more concentrated formulæ used for smaller work. For intensification with copper and silver, I find the most practical method is to have a large dish with a glass bottom, as you can inspect the bleaching action by simply looking underneath the dish without taking negative out, it can be washed and blackened with silver in the same dish, and again you can inspect back of negative in the same way, seeing that it is thoroughly blacked through to the back of the deposit. If any cutting has to

be done it is most important to realize that the blacking of the copper bleach is thorough, otherwise the resulting negative will be patchy, and give trouble when printing on metal.

When cutting with the iodide of potass and iodine, the solution must be diluted more than ordinarily to allow for the slower action, and this process is best done in the dish already mentioned, as the action can be watched with the magnifying glass with ease and certainty.

If at any time the screen negatives look sooty or clogged in the highest lights, owing to the screen sweating, which invariably occurs when copying through exceptionally plucky transparencies, to counteract this tendency a cover glass coated with *matt* varnish should be bound to the transparencies, and you will find that trouble disappear.

The suggestions in this *modus operandi*, which I have found practical in my own experience will, I hope, be useful to my fellow craftsmen.



A Lagoon

Block by
British Photo Engraving Co

Photograph by
S. L. Coulthurst

Innocence.

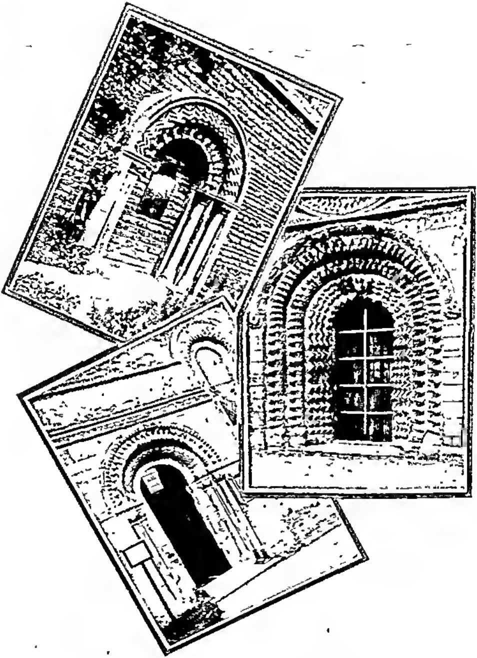
Des gn
Chas

The Hunting Girl.

THE HUNTING GIRL.

Three Colour Blocks by
Burman Rorton
(Max Levy's 200 Ruling)

From a Water-Colour Sketch
By kind permission of
Stafford & Co Netherfield Notts



Some Norman Doorways.

South Door, St Ebbe's Church, Oxford
North Door, Iffley Church, Oxford
West Door, Iffley Church, Oxford

Blocks by
Chas. W. Harness.

Photographs by
Mrs Catharine Weed Ward

THE ROUTING MACHINE. A RETROSPECT.

By CHARLES HEATHCOTE.

CHRISTMAS DAY

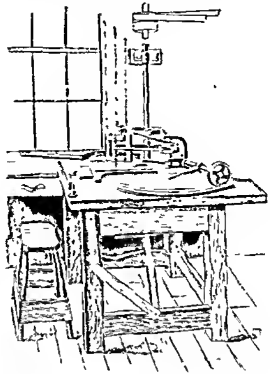
Block by W. F. SEDGWICK — Photograph by CATHERINE EDMONDS

IN reviewing the history of photo-engraving, and marking the rapid strides of progress which have attended the efforts made in bringing this art to its present high state of perfection, we are forced to acknowledge the Routing Machine as one of the important factors instrumental in achieving its success. More especially is this applicable in the marvellous developments of process-engraving The art which originally covered a limited field, and was practised more or less in secret by a few, is now a universally accepted trade of artistic attainments and high commercial value.

The introduction of engraving by chemical process, was attended by difficulties invariably associated with the initial stages of a new discovery. It was found that when etching the process-plate, in further endeavouring to reduce the "Whiting"—as the spaces between the lines were then called—to the right depth, there was a tendency for the fluid to undermine the surface of the metal image, and in the disaster following in the wake of such an unfortunate result, the etching would crumble until the engraving, if not entirely destroyed, was at least damaged Experiments had proved that the new venture was far in advance of anything hitherto attempted in perfecting the art, opening out as it did a new field of improvement with an almost unlimited range, so it devolved upon them to accomplish the means of overcoming the obstacle arresting its progress, in the best possible way they could.

Profiting by former experience, it was readily admitted that the most satisfactory way to get deeper into the metal, and obliterate the superfluous matter, was to cut out, or rout out the patches, and this could only be done by a machine specially adapted for work of such delicate nature. Herein lay the difficulty. The Routing Machine then in use had been all that was desired, having no difficulty in executing the calls made upon its resources, but these calls had never

exceeded anything demanding a very high rate of speed, which was the chief factor in routing work of the finest nature. Hitherto, a machine with a spindle running at the rate of about four or five thousand revolutions per minute, met the requirements with ease, but now, circumstances had arisen, which would necessitate the speed increasing to anything between ten and fifteen thousand revolutions per minute. The magnitude of this alteration is not apparent at first sight. Such a leap as this meant practically the construction of a new machine, entailing every part to be subservient to the control of such high tension, and capable of responding to the most sensitive touch. This state of affairs was brought to the notice of Mr. Vernon Royle, of the firm of John Royle & Sons,

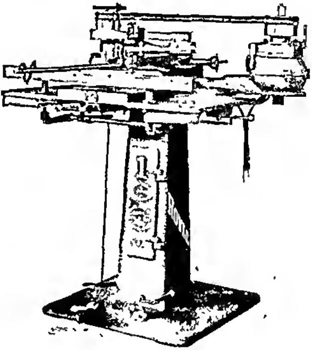


THE FIRST ROUTING MACHINE

Machinists, Paterson, New Jersey, U.S.A., and to no one more capable could the mission of supplying the needful have been entrusted. *Thoroughly grounded in* the experience of the trade of the photo-engraver, and fully conversant with all the details and intricacies connected with it, he was immediately able to grasp just what was required, and characteristically set about filling the gap at once. The result of the effort is well known. A machine almost human in its devices. Constructed in that marvellous simplicity relative to the genius of higher mechanism, each feature testifying as an example of fore-sight, the New Routing Machine exceeded all expectations, and was more than requisite to step into the breach.

From an awkward machine that had roughly hewed out the wood with no pretence of efficiency, it had been transformed into a wonderful piece of mechanism, gliding into a plate with a cutter revolving at the rate of fourteen or fifteen thousand revolutions per minute, capable of piercing into the most acute angles, and of executing the minutest work with the highest degree of efficiency. When it is remarked that oftentimes the machine was performing with a cutter 1/64th of an inch in diameter at the cutting end, responding to the merest touch at the will of the operator, it is easy to believe it capable of almost every motion possible with the human hand.

True is the old adage, "Necessity is the mother of invention," and equally true that there seems to be no limit to the inventive faculties of the human brain.



The Latest Routing Machine

For proof of this we need go no further than the facts manifested in the development of the Routing Machine, openly declaring themselves at every stage in the growth of its career.

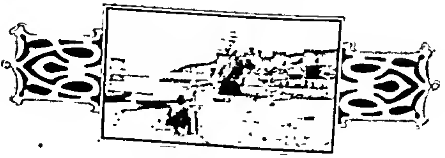
As far as can be ascertained, the first machine attempting to execute work of this nature, found its conception in New York City, about the year 1828. This machine containing a touch of the first elementary principles of a Router, was designed for the purpose of cutting out wooden poster type. This work had formerly been done with gravers and chisels, and when we consider that the type was of the hardest possible nature, and moreover the wood-end which had to be worked upon, we can readily understand the quantity of work required, and the time which was expended, in attaining anything like a fairly satisfactory result.

The machine, proving an advantage over hand-work, was adopted with more or less success by the wood-engraver, for the purpose of Routing, but the calls made upon the machine were very limited, and at no time demanding any high rate of speed. Keeping pace with the requirements which necessitated no great improvements, the machine travelled along its even course until the time of the arrival of process-engraving, which did not recognise wood as one of its accessories, dealing only in hard metals, such as zinc, copper and brass. This was the immediate cause of completely revolutionizing the Routing Machine, transforming it in the manner already referred to.

The first of this new type of machine to appear, was the Straight Line Router, claiming its birth about the year 1868. This machine was the very essence of all the best qualities and unique devices necessary in a complete and efficient Router. To see the easy manner in which the cutter "hums" its way through zinc, brass or copper, the facility with which the cutter is moved from point to point, the quickness with which it is lifted from the seat of action, and the numerous methods engaged in making secure the object operated upon, all proclaim for themselves the component parts of a master-piece. To these, and many other advantages contained in this machine, must be added the speci. adaptability of cutting straight and parallel lines, with mechanical precision, feature eminently valuable for many kinds of work, such as show cards, labels borders, etc. It is here worthy of mention, that though this machine has been modified and improved in detail from time to time, the general principles remain the same, which is in itself a high testimony to the foresight and wide range of adaptability contained in its construction.

Since the advent of this machine, following closely upon its heels, came the Radial Arm, The No 1 Router, The Combination Router, each with a special adaptability for distinct purposes, and a series of smaller machines, decreasing in size and advantages, and consequently in cost, placing themselves within the reach of the engraver with a standing of any dimension

Such is a brief retrospect of the Router, and if one may be permitted to judge by the experiences of the past, the future of this machine is open to all possibilities Even now the general clamour and increasing cry is for "more speed," and the wonderful perfection at present attained, may be all swallowed up in its elevation to a wider range of capabilities, some of which at this present time have not been utilized



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Conway

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Gudrun Carlson.

A Charming Danish Actress.

Blocks by
Dansk Reproduktionsanstalt.

Westminster Bridge.

WHY IS IT?

By W. Head.

"A Winding Streamlet, Limpid, Lingering, Slow"

Block by London Etching Co

Photograph by J. C. Phythian

IN the composition of human nature, the "bump of inquisitiveness" is more or less developed. If this spirit of "wanting to know" tends to the good of mankind generally, it is commendable; if for purely selfish purposes, it is abominable. How very often we are met with the above question, and upon what a variety of subjects does each individual seek information. Oftentimes the person best able to give an answer "Why it is," is either the last one enquired of, or, as is sometimes the case, the one who will not, or at any rate, does not supply the answer. As far as I am able, from my personal experience, I will endeavour to give an answer to a few of the questions with which I am often pressed, under the above heading.

The first I will take is one that has been put to me many times lately, *viz.*,—"Why is it that we, in England, seem to be drifting so far behind other countries in the production of fine art printing?" From my own experience, gathered and matured by extensive travelling on the Continent, in France, Germany, Holland, Denmark and Sweden, and after much study and careful thought thereon, I think I may be able to help to solve some of the reasons "why it is," although I in no way wish to set up my judgment as infallible, still, it may be helpful to some; and if so, it will be serving some good purpose, especially if it is the means of, in any measure, stirring up the various members of the many branches concerned in the production of fine art printing. The first query I will answer is the one most often brought forward. "Does the reason of good work lie in the fact that the foreigners have better machinery wherewith to do the work?" To this I must answer that it is not so much so as many people would lead us to suppose. True, the French and Germans of late years have brought out some really fine machines for the production of Art Printing, both by rotary and flat processes; and Denmark is even now making rapid strides in the same direction. But, in many instances the machines are of "our own make," and include such makers as Messrs. Hoe, the "Victory," and other well-known English and American types of machine. Therefore we have a better chance than they have in that direction, as also, that we freely import the "Marinoni," "Augsburg," "Miehle" and all other makes of superior class machines.

We cannot, therefore, place too much reliance on the word of those who maintain that it is in machinery we lack: especially as I have seen some very excellent work done by houses where the printing plant was as "old as Adam"—as the saying goes. I do not in any way wish to undervalue the advantages of

good, up-to-date printing presses—far from it. I know that, all other things being equal, the best machines can turn out the finest work, and far more expeditiously. "Then, it must be the plates are better," says the next man—of course he is a machine overseer.

Well, yes, in this I confess that—in many instances—he is "coming to the point": for in "screen"—or half-tone—blocks the "points" have much to do with the result of the good or bad reproduction of a picture. There are many things to say about what is required to attain the best results in this direction; most of which could be answered by a high-class photographer and an up-to-date process engraver and zinco-etcher. Therefore, I leave details for each of these gentlemen to fill in from their better knowledge.

As an amateur photographer, I know very well the advantages of good climatic conditions for the taking of a good negative, and also that, unless a fair negative can be produced, it is unreasonable to suppose that an etcher can reproduce a good plate, though I am afraid that many who *ought* to know this simple fact, do *not*

I at once admit that the foreigner has a great advantage just here over our English craftsmen. There is also another "point" which I picked up in France and Denmark from the most up-to-date etching firms in each country. I refer to the difficulty of securing a studio for the photographic portion of the work, that is sufficiently and properly lighted and at the same time free from vibration by day. This is absolutely impossible in any large town, and more or less so in other places, and this is one of the chief causes of "blurred" or "fuzzy" negatives. There are many devices—some really clever ones too—brought out to get over this difficulty as much as possible, as a visit paid to such show rooms as Messrs. Penrose & Co will convince anyone, but the fact remains the same. The two principal firms alluded to above have removed their photographing and etching studios away "far from the madding crowd" The one in Denmark has located himself in a large farm-house, the store-houses, barns, etc., being converted into various workrooms. This has many advantages which will appear obvious to all who give it any consideration, both as regards the producing of good negatives and also the far more favourable and healthy conditions under which the employés work and live. This latter is not to be under-estimated, for after all, it is the mind of the operator and mechanic which has more to do with good results than any of the machinery, for a good man will do far better with a second, or even a third-rate plant than a bad workman will do with a first-class installation. Just here, I would like to say, too, that at one fine house, just outside Paris, where first-class art and colour printing is carried on on a large scale, that the dining halls—provided by the firm for their workpeople—look out upon the beautiful garden of the proprietor, which at the time I visited the place, was

NORMAN ARCH WINCHESTER CATHEDRAL

Block by
LONDON ETCHING CO

Photograph by
REV. T. PERKINS

fairly ablaze with gorgeously coloured flowers, many begonias of various hues and roses, the aroma from which was delightful, and it seemed to be the favourite resort of singing birds and beautiful butterflies. This is an advantage which would be appreciated, I fancy, by some of our London workmen, as it would, under the natural condition of things help to train the eye and mind of the men and lads to a proper perception of colour and effect, which would be bound to produce a beneficial effect upon the work, especially in colour printing. I hope to have more to say later on upon this subject.

But, I do not wish our friend the machinist to stroke himself down and think that is the only reason of our being behindhand in this matter. Oh, dear, no! If it were so, it would be far easier to remedy than it is at present. His share, and that a large one, has to be brought to bear upon the matter; and his first is in the making of the overlays. I could say much here, but I remember the adage of "least said, soonest mended." Still, I feel that our English workmen generally have a big enemy to contend with, named "Prejudice": especially with anything that seriously affects any old, well-established custom. I sincerely advocate "holding fast that which is good," but I also believe in "trying" or "proving all things," and that impartially. The foreigners, especially the German and the "Yankee," have long since accepted the fact that "paste and paper," although old, are not the best materials for making overlays, and I agree with them.

At the Exhibition of Printing and Allied Trades held in May—June, 1904, there was one exhibit of mechanical overlays which attracted much attention, although the gentleman who introduced them to the notice of the trade bore a distinctly un-English name. Still I was glad to see that our home printers are showing a keener interest in these advances in their craft.

Some few years ago I made overlays in gelatine and rubberine, and many I have seen from America are made from similar substances, and others from a species of mica. On the Continent, at one firm who are engaged in working several branches connected with the printing industry, they have set apart a room specially for the making of overlays for "cuts" by chemical development, and a very nice process it is. I remember working one of my own making, side by side with a paper one made up by an experienced "cutter-out," and mine was made in half the time of the ordinary paper one, but surpassed the latter in its result, when properly put on the machine And it had this advantage, too, that when the required number of "runs" were accomplished, the plate upon which the paper overlay had been worked was ground down quite flat, whilst the other plate upon which the gelatine overlay had been worked, was as sharp as when it left the electrotyper's hands. They were both plates of Doré's works. This speaks for itself in regard to being able to keep up the fine appearance of fine art printing, also for colour plates I believe the time is not far distant when every plate maker—zinc or electro—will be required to supply suitable overlays with his plates. I think this will be a good thing, seeing that this branch of the trade is becoming more and more of a scientific business; and the man who is best acquainted with chemistry is the most suitable man to make up this kind of overlays; he also understands better what the artist aims at, in "lights and shadows." I am aware of the fact that these innovations cause jealousy among the men, especially in England, but this should not be so, and, as a matter of fact, is not so to any extent on the Continent, where every one seems to try to study the requirements of the next man. I shall have more to say about this further on.

My next point also lies with the Overseer of the machine department, or at least requires his superior supervision and judgment, and that carefully and

continually. I refer to ink and rollers. The firm previously mentioned as being connected with various branches of the printing business, have a large and important department for special roller and composition making, under the control and care of an expert chemist, whose duty it is to see that a proper and suitable roller or compo is made for every branch of work. His laboratory would astonish many of our "rule of thumb" and two sorts of "compo" roller makers. Yet I know for a fact that some well-known professional roller making firms in England have just two pots in which they run down the compo. for roller making; the one hard, or firm, for fast running machines, the other of softer compo. for ordinary work. In some houses I have been into on the Continent they keep four and sometimes five degrees of compos., besides a kind of rubberine, and some good first-class art and colour houses use leather-covered rollers for certain classes of work, similar to those used on litho machines. So that such houses, making a perfect study of their business, produce just such rollers as are most suitable—chemically and otherwise—for each particular class of work or colour. They also apply themselves to the study of the various pigments for inks of all sorts and shades of colour, and can advise, if required to do so, what is the best ink or roller to work upon any of the many sorts of metal of which printers' plates are made. And yet another advantage. The general rule of first-class houses abroad is to have about three more rollers for inking than is usual in England; and the best are all on the principle of our rotary machines, even on flat bed presses. Each and all of these things go to make up the advantage which the foreigner maintains over our workmen at home. "And don't they have more time allowed them than we generally get allowed to us here?" or, "Are they in as much of a rush as we are?" Thus enquires our worthy friend the machine minder.

THE FISHER GIRL

Block by T. H. Brown, Ltd. — Photograph by J. H. Young

To his query I can answer to his satisfaction. Abroad much more time is allowed on nearly all branches of work, even on daily newspapers, which are worked up to the quickest possible time as in England. But much more time is allowed in the careful making of plates, both etchings and electros, or stereos, and on colour work, very much time and care is spent. This gives the machine department considerably less trouble than is usual here, where "rush and tear" is the general order. In some cases this is carried on to such an extent that the etcher has no time to properly deep etch, and the electrotyper produces a shoddy-grown flimsy shell that "cockles" under the heat required to back it up; the result is that the machine minder has at least twice as much to do to make it ready as he should have, and no rubber or gelatine, or other overlay to assist him, but

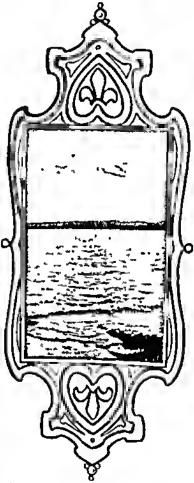
only a hard packing generally, which makes the soft plate sink more and more, until it is completely mangled out of its original shape, and the fine lines ground right down, with the ultimate result of an unsatisfactory production which is no credit to anyone concerned in its manipulation, and least of all to the person or persons who are responsible for the "rushing." And this brings me to my last question which I intend to answer in this already too long article, *viz.*:—

"What do you think would be the best thing to bring about a better state of things in England?"

Well, this question, like most others, has two sides to it. *First, as to the employer and second as* to the employés.

I enter upon the first with all due respect to our English employers of labour and wish to give them every credit due to them, and I fully recognise and appreciate the many good qualities displayed by them all; but especially, by those who, by their continued goodwill and kindly interest in the welfare of their workpeople—physically, morally and in many instances spiritually—do what they can to elevate the condition of those over whom they exercise authority.

But, unfortunately, in these days of "Limited Liability Companies," there are many who consider their responsibility ceases when they hand the workman his well-earned weekly wage, and they leave him to do the best he can for himself, but expecting, *of course*, that the said workman for all that will study his employer's best interest in every particular and every hour of his daily life. And, if he is an exceptionally clever and ingenious fellow and "has an idea or two" that will help on the business, well, they may or may not care to hear what he has to say about it, but it generally ends in the overseer or one of the "governors," who seldom has talent or energy enough to work out these things for himself, appropriating the idea or invention as his own, to the detriment, if not dismissal, of the workman himself. So what encouragement has the man to improve the business? The writer is speaking from sorrowful experience. Then, too, the desire to show a large dividend at the end of the financial year often causes both managers and employers—especially if the business is under a director of a Company—to refuse to lay out a single penny on experimenting, and in many cases even as much as other firms consider absolutely necessary for the proper production of their business, reminding one very much of the Egyptian taskmasters, who demanded that the Israelites should make the full tale of bricks, without finding the straw for them. Quite needless to say that these houses are invariably at the tail end of their profession.



"Glittering Waves and Skies in Gold Arrayed"

Block by Dean Engraving Co — Photograph by J. C. Phythian

I could say much more to the point on these matters, but sufficient has been advanced to serve the purpose I have in pointing out some reasons why the foreigners gain a distinct advantage over us in this way. There is only one other

item upon which I should like to say a word or two, especially as it appears to be much on the increase just now in England. I refer to the great preference shown for younger labour—some very young too—in many business houses; especially again the "L.L.C." sort. This is often the first step on the down grade of many a good house, and it is a bad day when ripe experience has to make way for what is often only "bunkum."

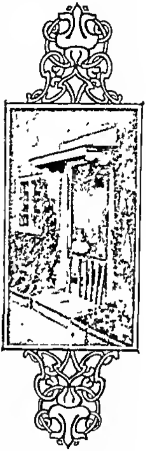
Now, this latter disqualification seldom occurs at any of the large number of good houses I have visited abroad, for there, the old men are kept on, even at a trifle less wages, for the sake of their valuable experience, as well as from the kindly consideration of the employer, who seems rightly to consider that after twenty-five to forty years' service the men have a sort of claim upon the establishment.

In most houses of any size, a pension scheme is worked, so that the lad, as soon as he starts work for the firm, commences to pay into this, and for sickness. So that, if he remains with the firm until he is an old man, he draws his pension, which, added to his reduced salary, usually between a half and three-quarters of his previous full wages, he can live comfortably upon, and does not feel pauperised by doing so, and the firm, of course, can at all times draw upon his valuable and long experience, to the benefit of themselves and also the younger workmen. Then, too, all good houses, if any size at all, have their own technical schools and experimenting shops, at each of which, during proper and regular hours the apprentices and younger mechanics are expected to attend. And as a general rule, they are very glad to do so. At these schools or classes every man is directly under the supervision of the instructor, and, if he "has an idea" worth considering, it is fostered and carefully examined upon its merits. If it is likely to be of use to the firm, the man has a small shop, or section of a shop allotted off to him with every facility to develop his invention. If it proves successful, the man is placed in permanent charge of the department, and if it develops, he becomes the manager of that department and receives a share or shares in the profits of the business Thus, every encouragement is given to the men to further improve the work, for their own interest as well as for that of the firm. This is as it should be In several firms I have visited on the Continent, there are many men in such positions, and they are of far greater use to their employers than a man who is of no practical use, but who perhaps has helped to finance the concern. Thus, in a few years the firm distinctly gains by any outlay it may make on the men's behalf and a temporary sacrifice becomes a permanent gain. Just one more incident I will relate, which impressed itself strongly upon my mind, as revealing the secret of that bond of good will among men which is at all times beneficial, but especially so in business relations between employers and employés.

I was travelling at the time through France and Germany, when the following incident occurred, *in both countries*, and by a large employer of labour in each case. I was accompanying the gentleman in the former country—having obtained permission to spend some few days in his vast printing establishment—some forty-five miles out of Paris We arrived somewhat late in the evening at our destination, and most of the workmen had left off work for the day; but, every overseer and foreman was waiting for the arrival of his employer, in much the same way as a family of sons might be awaiting the arrival home of their father. The principal received a warm welcome, we, *i.e.*, my comrades and myself, were next introduced to all, our visit explained, and after urgent business connected with his visit to Paris was disposed of, the meeting was adjourned until the next morning At this meeting I was again present, when each and every overseer who was connected with whatever orders the employer had received

and brought with him from Paris and elsewhere, was consulted on the matter, and each endeavoured to anticipate the next man's wants and the whole thing was so well put in hand, that it was "done before it was begun," so to speak. How very different from some houses I have laboured in, where we have not been informed of its arrival into the Order-office, until the work itself has come into our individual departments, and which, of course, we had not made preparations to turn out. Result—rush, excitement, indifferently executed, disappointment, dissatisfaction, and increased cost through overtime worked to get it out to time, therefore, financially a loss. So much for one side of the question. Now for the other, *viz.*, the workman.

I, as a workman and overseer, have had practically unlimited opportunities of seeing and knowing the shortcomings of the men in London, the provinces, and abroad. But the real London mechanic, with all his greater advantages over his "country cousin," is far behind the latter in many ways; and it is a notable fact that the best workmen and overseers are men who have come from the provincial houses and received a good practical insight into the work of a good London house of business. There are, I believe, several reasons for this. First: he has been brought up in a healthier atmosphere, therefore, physically he is better able to stand the strain of hard, persistent work, and his brain is clearer, more active and intelligent in the true sense of the word. He may not be so witty, sharp, tricky as his town cousin, but then often he is not so morally debased either. He is often less inclined to frequent the tavern, low music-hall, or "peony gaff" style of theatre, preferring to take his pleasure in sight-seeing, cycling, river trips and in visiting the various museums and other places of interest where his mind acquires some real knowledge, which he can afterwards turn to some good account. If he takes his glass of stimulant—though some are very abstemious in this matter—he does not spend much of his time at the bar, "talking matters over to the detriment of one of his fellow craftsmen's character," as I am sorry to say so many London mechanics do And then, again, he prefers to spend a fair share of his evenings and Saturday afternoons in attending the few—too few—technical classes, or the Polytechnic, where he can gain some useful information concerning his trade and profession, or in reading and studying some equally useful book. In this matter he is nearer the foreigner, especially the German and the Dane, for these latter attend most regularly; with the result that they can surpass most English workmen in their knowledge of their handicraft from a purely scientific point of view And this is what is most needed in this present day of up-to-date machinery, which is made and should be worked upon scientific principles This brings about the result so plainly seen, *viz.*:—that the English mechanic, having drifted behind the times, has only one road left open to him, and thus he takes to "bluff" with what he *does know*—and sometimes a bit of what he *does not know*—and to hold on to the "old style"

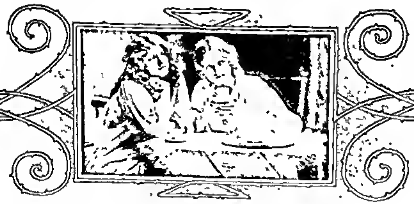


A Cottage Door

Block by Gilchrist Bros — Photograph by E. Cecil Hertslet

with a bitter prejudice against anything like an innovation on his long-established rights. And yet the Englishman is quite capable of outstripping every other nation in his ability to excel in his own particular craft, if once he will make up his mind to study, persevere and determine so to do. I am quite convinced that, given the same amount of encouragement and kindly consideration by his employer as he deserves, and an abolition of all unnecessary rush, and by an intelligent and persistent application to the ever-advancing technicalities of his business, the British workman can still climb to the top of all.

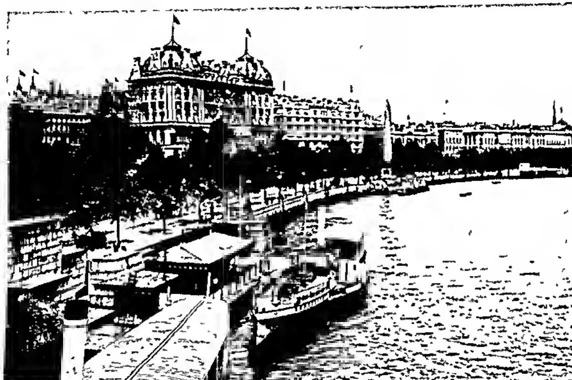
This is my desire, to see him once again at the head of his business. To help accomplish this end, I have undertaken to write my experiences to Messrs. Penrose's excellent Year Book, as well as my former writings to our monthly trade journal. Hoping that my little effort will help to solve the problem, "Why is it ?" by pointing out some reasons "Why it is," and "How to remedy them."



AFTERNOON TEA

Block by
LONDON ETCHING CO

Photograph by
H. GOLLTON MAY



The Thames Embankment.

A New Colour Process
from an Uncoloured Photograph by
A. E. Dent & Co

Peaceful Old Age.

Block by
British Photo Engraving Co

Photograph by
S. L. Coulthurst

U'wc's French Brown Ink.

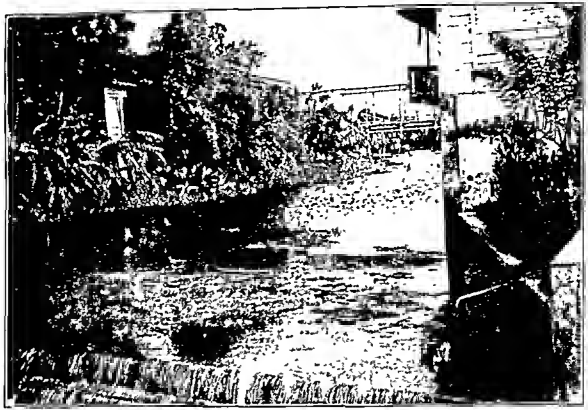
The Dimitri Donskoi.

" Loomed aloft the shadowy hulk!
And around it columns of smoke upwreathing "

Plate lined on
Royle s Lining Beveller

Photograph by
Vernon Royle.

Ullman s Smoke Black Ink



Puentes Grandes, Cuba.

Block by

Bonnie Scotland.

Block by
London Etching Co

Photograph by
H. Goulton May

THE
LITHO

THE EVOLUTION OF LITHOGRAPHIC PRINTING MACHINERY.

By Jos. Goodman,

Technical Teacher of Lithography, and Photo-Mechanical Process Classes at the Liverpool Technical School

HOW few of those who have beheld and admired the many beautiful productions of the Lithographic Art, have paused to contemplate the stupendous travail that myriad minds have undergone, in enriching the productive world with the mechanical conquests necessary to the service of Lithography, in its extensive applications to Art, Trade, and Commerce; how few of those who own, and of those who work the majestic litho machines of to-day, have attempted to pass in review of their mental vision, the ever upward and onward progress of these mechanical triumphs, that have thus placed at their disposal this effective colossal machinery, with which their lives and welfare are bound; and of the striking contrast to that of an earlier period, with its humbler appliances, which in their day had built the fortunes and reputations of past generations of their craft.

Luna

Block by Dean Engraving Co — Photograph by H. G. May

It was the productions of the old wooden press of Senefelder that drew forth from Prince Louis, of Bavaria, the historical remark, "*Lithography is one of the most important discoveries of the 18th Century*"; and to what other source than Lithography could the pictorial legends that spread a halo of universal immortality around Napoleon be ascribed? How many of the old, as well as the modern masters' original drawings, have gained perpetuity, through intervening generations, except by Lithography's multiplying powers of copying, before the

Aloys Senefelder,
Inventor of Lithography, 1798

advent of the camera ? And yet, despite prudish notions of superfine modesty, it is to-day a cultivating force, even in poster garb, speaking from the city walls to the multitude still, with its examples of feminine beauty, even though employed in the interests of commerce and manufacture, whether of soap or less prosaic commodities: appealing alike to the perception of the prince and the proletarian.

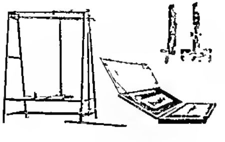


Fig I Pole Press

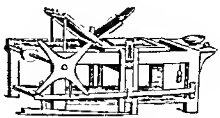


Fig II. Star Press

The development of machinery in Lithography has been one continuous gradual chain of progression, providing a figurative parallel to the primeval hollowed trunk of the oak, as used by the aboriginal as his means of transit across the river stream · up to the present luxurious liner, ploughing the mountainous billows of the ocean, defying the tempest and the storm, and annihilating distance and time

The primitive wooden press first used with advantage in Lithographic printing, was a "*child of the brain*" of the resourceful Senefelder, being an "upright Lever Press," generally known as the "Pole Press" (fig. I.); it possessed a 'frisket,' 'tympan,' and stone bed, as shown in left-hand figure, and had a printing pressure of 5 cwts, with two printers, it yielded 1000 impressions per day, at the cost of a considerable expenditure of human energy, consequent on the small leverage in proportion to the great friction involved.

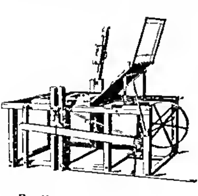


Fig III Old Scraper Press

With the object of reducing this waste of energy, the "*Cylinder Press*" (fig II.) was constructed by Prof. Mitterer (the most apt pupil of Senefelder), and was commonly called the "Star Press," by the printers, on account of the star-shaped wheel at the side, used for pulling the stone carriage under the stationary scraper, which is in inverse order to the Pole Press, where the lever, with scraper attached, moves over the stationary stone. Variations of this type of early litho presses are seen in fig III, the main principles of compression still being retained in the hand presses of to-day Prior to the construction of these various presses, Senefelder

had tried the copperplate press and the letterpress; he had also taken impressions direct from the stone on damped paper, by rubbing with a piece of polished wood; but this method was too slow and uncertain, as out of three reams of the best paper, printed by the aid of six men, only 33 perfect sheets were obtained. Other trials had also been made with a press that had a stone of 300 lbs. weight suspended from it, at a height of 10 feet, which increased the pressure to 50 tons, and succeeded in yielding one good impression, but at the second one the printing stones always broke, and on one occasion the heavy ballast stone became dislodged, Senefelder just escaping being killed by its fall, which stopped further experiments with this hazardous implement.

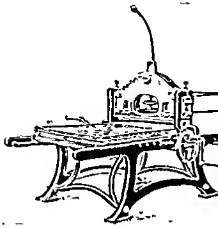


Fig IV Top Lever Press

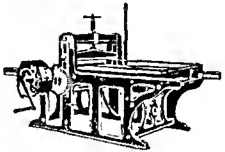


Fig V Side Lever Press

With the subsequent spread of Lithography over Europe, presses of a more stable, and utilitarian character in iron sprang into being, the two kinds which have secured permanent adoption being the top lever pressure press (fig. IV.), and the side lever ones as fig V., which is the most popular type.

The next great advance was the steam Litho cylinder machine (figs. VI. and VII), invented at Paris in 1850, by Eugues (on the principle suggested by the

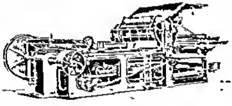


Fig VI English Litho Machine

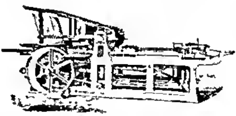


Fig VII American Litho Machine

ingenious Englishman, W. Nicholson, for letterpress machines), subsequently improved by Hughes & Kimber, of London the same year steam was first applied to the hand presses Till some years later, though, the trade was loth to adopt them, but by 1875, they were being taken up with avidity, which fact elicited enthusiastic comment from the Editor of the *Printing Times & Lithographer* of that year, in a leading article, in which he remarked: "The gradual

introduction of machinery, to supplement or supplant the old hand press, is one of the signs of the times." At the same period and through the same medium, an employer wrote :—"Match labels to-day, as printed from Litho machines, would pass for Bank Notes one hundred years ago." A year later, in 1876, the demand for Machinemen was so great, that we find the same trade paper again averring that :—" Litho machines have come so suddenly into use, that trained machinemen are far below the actual requirements of the trade." Verily the golden age for the Litho craftsman.

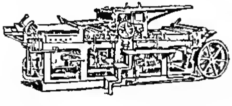


Fig VIII Two-Colour Litho Machine

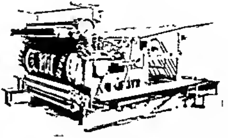


Fig IX Aluminium Rotary Machine

To meet this demand for machines, makers multiplied in different parts of the Kingdom, but to the City of Leeds belongs the honour of having the largest number of firms manufacturing these new machines

Our American cousins, untrammelled and enfranchised from old-world insular prejudices and conventionalities, and impelled by their peculiar climatic and ambitious prodigality, strove to go one better than the Motherland by launching a *two-colour litho* (fig VIII)

But the most striking development yet attained is that created by the use in Lithography of the new metallic printing surface "*Aluminium*", which has called into existence the most gigantic and costly machine yet employed in the trade, the "*Aluminium Rotary*" (fig IX), a veritable Goliath of mechanical precision, in comparison with the modest wooden press of 1798

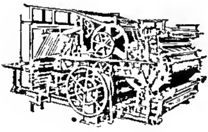


Fig X
Two Colour Rotary Litho Machine

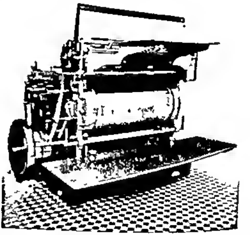


Fig XI New
Three Cylinder Rotary Tin Printing Machine.

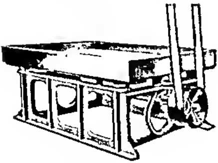
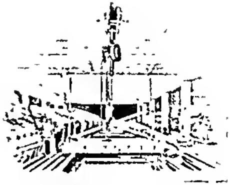
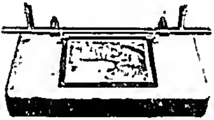


Plate Graining Machine

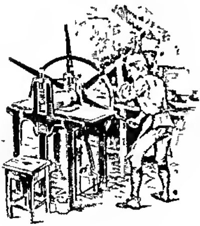


Litho Stone Carrying Apparatus

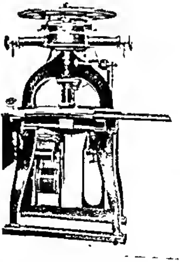


Shading Apparatus

Stone Engraving Machine

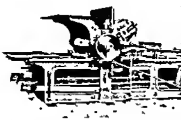


Old Copperplate Press

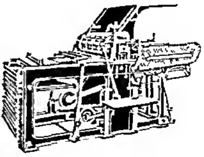


Modern Power Die Plate Press

It is barely 14 years since this metal was first shown to possess the requisite, and efficient qualities: it is now fast establishing itself throughout the printing world, and it has already taken to itself the most imposing and productive mechanical appliance yet employed in production in this century-old craft, and the possibilities are still in the future; already, the land of the "Star-spangled banner" has again set the pace in building a "*two-colour Rotary*" (fig. X.), whilst we are still busy with the one-colour machine.



FLAT BED TIN PRINTING MACHINE

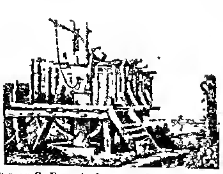


COE COLLOTYPE MACHINE

The auxiliary lithographic machinery as the "Stone Planers," "Levigators," and "Plate grainers"; the "Pantagraphs," and the "Copperplate presses"; the "Halligan," "Engraving" and "Tin Printing Machines" now built with three cylinders to print from Aluminium on the Rotary principle (fig XI.) "Collotype," etc, preclude more than a passing recognition in order to afford a more complete, connective, pictorial record and review of the lineal forms of salient machinery used in the trade, from its inception up to date, typifying the great successive changes made by the inventive genius of mind after mind, in the chief mechanical aids to Lithographic productions, in lieu of the fragmentary and disconnected records hitherto existent, and forming a modest tribute to the realization of the fervent wish of Senefelder in 1817, when he said, "God grant that it may soon spread all over the world, and prove useful to mankind, and contribute to its improvement, and that it may never be abused to any wicked purpose; I shall then never cease to bless the hour in which I invented it" And now in the year of grace 1904, it has trebly emphasised the poem of praise bestowed on it by the illustrious author of Dr Syntax, in 1819, when he sang —

E'er Art is to its full perfection brought,
What strength of mind, what energy of thought,
What bold Invention, what expansive power
Blend in the labours of the pregnant hour
How much then from a grateful age is due
To those who toil, Senefelder, like you?

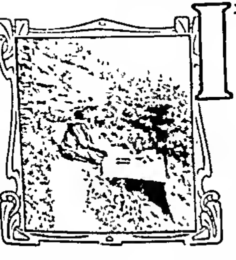
How great your boast, who, by your matchless skill,
Can quicken labour's progress at your will,
Can by your Chemic, multiplying powers,
Convey to Life so many added hours:—
And since your potent art began to live,
One Hour creates what days were wont to give



ONE OF S PROUT'S ORIGINAL LITHOGRAPHS, 1818

THE INFLUENCE OF GRADATION ON COLOUR REPRODUCTION.

By Chapman Jones, F.C.S., F.I.C., F.R.P.S.



A Wayside Stall.

Block by Marshall Engraving Co. Photograph by H. C. Leat.

In all photography from half-tone subjects, gradation is one of the primary matters for consideration. The gradation, or "values," as its separate items are sometimes called, in an ordinary print is rarely correct, for the negative and the printing process both independently tend to falsification, especially at the ends of the scale, and this doubtless is one reason why low-toned subjects with a small range of lights are often preferred by critical workers, the narrower range giving less possibilities of error. But whatever difficulties of this nature present themselves in ordinary photography, they are much increased in colour reproduction. In this case it is not merely a matter of approximately true values, but also of an equal gradation in the three colours. The effect of colour on gradation becomes, therefore, a question of primary importance.

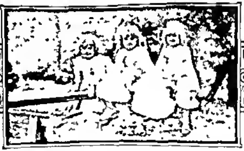
A considerable number of experiments that I made in the endeavour to answer this question, indicate that an increase of wave length generally results in a greater steepness of gradation, other circumstances remaining the same. That is, that green light gives a steeper gradation than blue, and red steeper than green. This was the general result, but some plates appeared to behave exceptionally. Sir Wm. Abney investigated the same matter independently, and arrived at the conclusion that the least steep gradation is given by the colour to which the plate is most sensitive. My experiments do not allow of this interpretation being placed upon them, but for all practical purposes, Sir Wm. Abney's results and mine point in the same direction, namely, that the plate taken through the red screen may be expected to show a steeper gradation than that taken through the green screen and this steeper than that taken through the blue screen. (The difference between our results is that while Sir Wm. Abney found violet and ultra-violet to give a steeper gradation than the blue, I found it generally to give a less steep gradation.)

It is, perhaps, hardly necessary to point out the effect of such differences in three-colour work. A steeper gradation means a more sudden change. If, therefore, the three colours give a good black or grey in the darker tints, the lighter tints will be found to lack the colour represented by the steeper gradation. In ordinary work, this would result in a preponderance of yellow or reddish yellow in the lighter tints. Or if the lighter tints are balanced to give a good neutral grey, in the darker tints there will be an excess of blue. Doubtless it is possible to argue that such errors, if not excessive, are not very important,

the yellow being covered more or less by the other two printings, and the blue used being so nearly black to the ordinary eye, that a little excess is hardly perceptible.

If the plate makers could furnish plates that would give equal gradation irrespective of colour (and this could easily be tested by giving similarly graduated exposures behind suitably coloured screens), then this difficulty would be surmounted. It would remain then to make the three exposures on the *same plates, and to develop them together*, to get equal gradation in all. The period of exposure of each would then be the only factor in determining its density with relation to the other two.

This would be a step towards the realisation of the automatic reproduction of colour. But there would remain so many imperfections that would need compromises, that more exactness in this detail might not result in any very obvious and practical improvement in the print. But, however this may be, it is only by working at each problem separately and eliminating the uncertainties one by one, that real progress can be made and perfection approached.



SEE SAW

Block by
MARSHALL ENGRAVING CO

Photograph by
REINHOLD THIELE

STEREOTYPES OR MOULDINGS FROM PHOTOGRAPHS IN RELIEF: PRINCIPALLY SWELLED GELATINE.

By Thomas Bolas, F.C.S., F.I.C.

Mistress Mary

Block by Acme Tone Engraving Co — Photo by Catherine Edmonds

THE earliest photographic printing plates of which we have record, were etched from metal, the etching method having been adopted by Nicéphore Niépce about 1815 or 1816, although the oldest printing plate of his now known to exist is the etched intaglio portrait of Cardinal d'Amboise, now in the Museum of Châlon and this appears to have been produced in 1824.

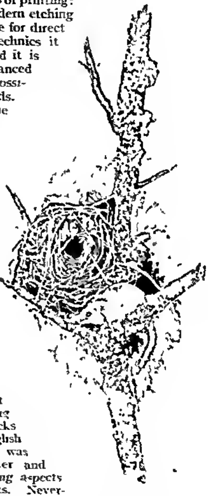
That renewed activity in photography which followed the publication of the Daguerreotype method in 1839 and of the improved or workable Reade-Talbot method shortly afterwards led to an immediate interest in the question of mechanically printing photographs on paper from metal plates, but at this stage, mouldings from true photographic reliefs, rather than etchings were more especially to the front. The Daguerreotype photograph is itself a relief, a piling-up or deposit on a smooth mirror-like plate of silvered copper, and upon the Daguerreotype plate there was deposited a sufficient thickness of electrotype copper to form, when removed, an intaglio printing plate, the original Daguerreotype plate being uninjured by the moulding and ready to yield another intaglio or reverse by the Electrotype process

The intaglio printing plates thus produced yield impressions of marvellous delicacy and detail but the depth and ink-holding properties of the plates were so unsatisfactory that this photogravure method of 1839, or thereabouts, was used for little else than purely technical representations.

In this process we have as far as I know the first instance of the making of a cast or stereotype (the term stereotype is here used in its widest sense) from a photograph in relief, but soon afterwards it was found that a print made on bichromated gelatine and swelled in water may possess a degree of relief enormously greater than that of the Daguerreotype plate, moreover; the swelled gelatine relief is singularly easy to produce, and it may be granulated either naturally as by the reticulation or wrinkling of the gelatine, or artificially as by the use of a screen negative. In addition, stereotypes or casts from the swelled gelatine may be made either for intaglio printing or for typographic printing.

Curiously enough the swelled gelatine process was the leading and most discussed method during the incubative period of photo mechanical printing or up to about 1885, a time when photo-mechanical methods acquired considerable industrial importance, but from that time forwards swelled gelatine has steadily gone down and at the present time etching methods are paramount

Looking at the truly level or even surface as an essential in relation to our modern methods of printing: at the ease, rapidity and perfection of modern etching methods, I cannot see any immediate future for direct stereotypes from swelled gelatine, yet in technics it is often the unexpected that happens, and it is highly desirable that experimental and advanced workers *should not lose sight of the possibilities* and peculiarities of collateral methods. The very fact that the swelled gelatine method is so much out of use should make the advance man, or the man who wishes to keep in advance, study it carefully; and this on the good old principle of "Sweeping the corners and leaving the middle to sweep itself" In illustration of the more or less latent possibilities of the swelled gelatine method, I may refer to the final section of this article, where the advantages of swelled gelatine combined with etching are indicated, as against the usual combination of swelled gelatine with a moulding or stereotyping method



Wood-Mouse

Block by Wallace & Gilbert — Photograph by Hermann Lea

The Pretsch Process of 1854

In the Pretsch method, when successfully carried out, we have, I think, the swelled gelatine method in its highest degree of perfection and, notwithstanding the fact that swelled gelatine printing blocks were made before the time of Pretsch (English Patent No. 2373, of the year 1854), it was Pretsch who fully realized the full power and scope of swelled gelatine in its three leading aspects and who produced good commercial results. Nevertheless, Pretsch's Company failed commercially, as the public were not then prepared for photo-engraving on an industrial scale

The Pretsch Process for Half-Tone Typographic Blocks

There is considerable latitude as regards the sensitive bichromate gelatine mixture, but the following is good. Dissolve with warmth 2 ounces of hard

collotype gelatine in 12 ounces of water, and divide this fluid into two batches, one of about 2 ounces and the other of about 10 ounces. In the two ounce batch, dissolve 60 grains of silver nitrate and in the ten ounce batch dissolve 220 grains of potassium bichromate. Mix the gelatinous solutions, stir, add 50 grains of dry calcium chloride and 160 grains of glycerine; stir well until the calcium chloride is dissolved; filter through muslin and set in the water bath at a temperature of about 120 degrees Fahrenheit.

A layer of this mixture is dried on a levelled slab of plate glass, supported in a collotype drying box For ordinary work the layer of gelatinous fluid should be about one thirty-second of an inch thick or as much as the levelled plate will conveniently carry. The drying should be at a rather high temperature, not less than 120 degrees Fahrenheit. All the precautions for obtaining an even film are as in ordinary collotype and for a full account of these precautions, a book or article on collotype must be consulted.

The plate is now exposed under an ordinary or non-reversed negative and it is in the exposure of the plate that experimenters usually fail. A short exposure as for an ordinary silver print followed by immersion in water will give a swelled relief of most seductive beauty, but valueless for our purpose. Roughly speaking, the exposure must be about 25 times that which would be required for a usual silver print and one chief criterion of exposure is that those portions of the gelatine which were under the transparent parts of the negative must not swell in cold water, but must remain hard and smooth, but guides to the progress of the exposure or small pilot plates are essential All other parts swell in varying degrees and reticulate or wrinkle on the plate, a rather coarse grain for the lights and finer grain for the deep tones, but the pure blacks remain smooth. It is the wrinkling resulting from this swelling when the plate is soaked in cold water which gives the film its printing character, not a general swelling or uprising of the less-exposed parts. Hence it is that if the exposed and soaked plate is moulded wet, the reverse obtained will be a printing block which is extremely unlevel, the blacks being high and the whites low. If on the other hand the plate be allowed to dry before it is moulded, a printing block will be obtained which is generally level, and the printing quality will depend entirely on the fineness and distribution of the grain which results from the wrinkling of the swelled parts of the gelatine For modern fine printing the gelatine

Serpolette

Block by Marshall Engraving Co

Photograph by C Sweet

film should be moulded when dry. As the reverse of the gelatine is the printing block, electrotyping directly on the gelatine film suggests itself, but this is uncertain for many reasons, especially when the dry film is to be moulded. Direct moulding with celluloid suggests itself, the plate and a thick sheet of celluloid being both heated to about 270 degrees Fahrenheit, and a powerful press being used. I have not tried this and I doubt whether the film would remain on the glass at this heat and under pressure, but celluloid makes admirable stereotypes.

The method of moulding which I know to be satisfactory is the following:— The plate bearing the original gelatine film is warmed to 180 degrees Fahrenheit, or thereabouts, in the collotype oven, laid horizontally on a table, bordered with inch-high lead clumps, also warmed, and melted sulphur is poured evenly on at one corner with one uninterrupted flow. The sulphur must be melted with constant stirring, so that it does not thicken by overheating, and if one-tenth of finely sifted and well-dried bath-brick dust is well mixed with the sulphur, so much the better. The sulphur cast detaches itself spontaneously, and for a trial or experiment it may be used as a printing block, but ordinarily it must be reproduced by the usual plaster stereotyping process. When a little height and depth as well as grain is required on the printing plate, the gelatine relief on its plate-glass support is well soaked in equal parts of glycerine and water, and after being blotted off the plate is heated to 180 degrees Fahrenheit preparatory to the casting with sulphur. *A cast from this kind of gelatine relief, when completely* or thoroughly swelled by soaking in water, and in its wet state, is not required under any circumstances that I can suppose, as the printing block obtained in this case would be unusable in modern printing, by reason of the depth causing a white halo round dark objects. Still it may be stated that fine plaster of Paris may be used for casting from wet gelatine.

Wee Willow Wren

Block by [illegible]

Photograph by [illegible]

"We Two."

Block by Weekly Press
Christchurch N Z

Photograph by
Hemus Sarony.

A Night at Sea.

Block by 'Weekly Press
Christchurch N Z

Photograph by
S. Head.

Trentham Hall, from the Park.

Seat of the Duke of Sutherland.

Block by
Acme Tone Engraving Co,

Photograph by
"Motoring Illustrated"

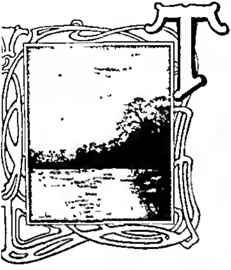
The Jewel Cabinet.

Half Tone with Woodcut Finish by
W. & C. Boyd, Ltd.

Photograph by
Lafayette

NOTES ON A NEW AND IDEAL DYE FOR SENSITIZING PLATES.

By T. Thorne Baker.



"A Gleam of Golden Sunset"

ck by Hampl & Co — Photograph by J C Phythian

THE day has now come in three-colour photography when colour filters have been adjusted to a nicety to panchromatic and other plates, and when the printer has found that by an accurate adaptation of filters to plates a great deal of retouching in the negatives and of re-etching the blocks is obviated. But wet filters if carefully sealed, and dry filters if carefully preserved, will remain constant within a very little, whilst the dry plate is known to vary with nearly every batch that is made. The plate maker must certainly be given the credit for having produced a fairly constant colour sensitive plate, but it is nevertheless a fact, and one which I venture to say is acknowledged by all, that the bathed plate possesses some advantages to which the manufactured colour-sensitive plate can lay little or no claim

Take an erythrosin plate by way of example The best commercial orthochromatic plate is not so highly sensitized for yellowish-green as an ordinary dry plate bathed in a weak solution of erythrosin and ammonia, and as is well known, a plate bathed in an erythrosin solution containing silver nitrate will give a sensitiveness to yellowish-green which is tremendous compared with the commercial erythrosin plate

The commercial plate, however, is probably nearer the ideal from a theoretical point of view, as equal luminosity in each colour ought to give the same effect upon the film In three-colour work, nevertheless, the more even the distribution of colour-sensitiveness, the better the plate, and hence we can sum up the properties of an ideal plate for colour photography as follows —

It must represent the whole spectrum by an even band of density, when the spectrum is photographed upon it it must work free from fog; it must give good gradation and be capable of giving considerable density, it must be free from halation and above all, its colour sensitiveness must be always constant.

I shall now proceed to indicate how nearly ideal in every respect is the newly introduced dye Homocol, a product of the Bayer Co, which for bathing plates works with the certainty and efficacy which constitute perfection

The dye Homocol is of a warm violet colour, having a green spectral absorption, but being so powerful in its action that the quantity absorbed per plate barely discolours the emulsion It will perhaps be well first to give general directions for the bathing of the plates, and to show the results obtained later.

To begin with, plates free from all trace of fog must be selected, and it is therefore advisable to use those of the extra-rapid type, and not extremely fast ones. The bathing will be found in most cases to slightly increase the speed of the plates.

Prepare a solution of—

Water	100 parts.
Homocol (1 in 1000 alcoholic solution)	1·5 part.
Ammonia (.880)	2 parts.

The use of the ammonia is not essential, but it appears to render the results more constant than if the dye be used without, if indeed more constancy be possible.

This solution should be made up just before use, and used very soon afterwards

The plates to be bathed should first of all be carefully dusted, and then laid in a porcelain or glass dish which has been thoroughly cleaned, first with nitric acid, then water, then dilute ammonia, and finally with water again. If a number of plates are to be bathed, it will be found convenient to employ a grooved porcelain trough such as is used for washing, and this should of course be cleaned equally carefully.

The plates are now immersed in the sensitizing bath for two minutes, then removed and placed in running water for two or three minutes, and afterwards placed in a rack to dry. Drying should be carried out as expeditiously as possible, the room being heated by steam or some other means; two hours' drying is the maximum that should be required for the most perfect work, but it will be understood that if the plates are allowed through lack of proper means to dry spontaneously, the results will be little worse, save perhaps that they may be a trifle foggy and will not keep so well between bathing and exposure. It is evident from experiments I have carried out that the bathed plates, if repacked as soon as dry, will keep for some weeks at any rate

Now, as regards light in the dark-room Homocol confers very great red-sensitiveness to the plates, and hence only dim red light, and that of the proper kind, should be used during the bathing and subsequent development of the plates. (Drying must be carried out quite in the dark). Personally, I use a tank lamp, the solution containing about equal parts of naphthol yellow and Titan scarlet, and in front of the tank is placed a piece of double-flashed ruby glass

Let us now assume that the bathed and dried plates are to be put to the test, and describe the results that have been attained with them

The first test I always apply to plates sensitized for colour is the spectrum, as by casting upon the film the broken up rays of white light, it is possible to

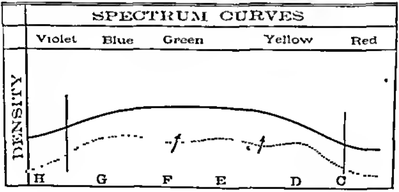


Fig 1

ascertain precisely to what extent it is sensitive to different colours and also the relative sensibility to each. Plates bathed with Homocol, with and without ammonia, give with incandescent gas illumination in Tallent's diffraction-grating camera an almost absolutely even band of sensitiveness. In other words the Homocol bathed plate possesses a sensitiveness to the whole spectrum which is practically ideal, and better than that I have been able to obtain with any other dye or plate at present known.

The sensitiveness is plotted out on a curve shown in Fig. 1. The densities of the bands of two exposures were read, the plain curve representing the reading obtained with a long exposure, the dotted curve that produced by a short exposure. From an examination of the latter it will be observed that with short exposures two minima are faintly visible, one in the bluish-green and one in the greenish-yellow, but these are so extremely slight that a very sensitive instrument was required for reading them. That portion of the curve between the vertical lines represents the part of the spectrum plainly visible to the eye, and from this it will readily be seen that the Homocol plate is, as already said, practically ideal.

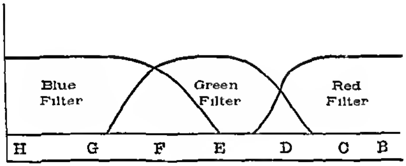


Fig 2

On slightly increased exposure the sensitiveness will be found to extend beyond the visible red and well into the dark violet.

The foregoing remarks will make it evident that this dye is an excellent one for use in three-colour work, and a varied set of experiments have shown that the gradation to be obtained with the bathed plates is very fine In the first place, it enables one to obtain delicate differences of colour, so that the intermediate colours are accurately recorded as well as the primaries. Further, the employment of such a plate means that the adjustment of light filters to it is a comparatively easy matter

The absorptions of the filters suitable for use with Homocol bathed plates are approximately as shown in Fig 2, and of these only the red absorption needs our special attention With an average panchromatic plate the red filter should permit a portion of the light up to the end of the green, at $\lambda = 520$, or thereabouts, in order to obtain the varying shades of green (with a blue filter similarly tapering off in the opposite direction). But Homocol confers such excessive green sensitiveness on the plates that a much more abrupt ending to the red absorption is necessary

The following filters will be found to answer well with plates sensitized wi
Homocol :—

BLUE.	Methyl blue	10 parts
	Naphthol green	1 part.
GREEN.	Naphthol green	10 parts.
	Naphthol yellow	4 parts.
RED.	Titan scarlet	4 parts.
	Naphthol yellow	10 parts.

These should be mixed with from one thousand to three thousand times th quantity of water, for use in a fluid cell, the dilution being increased until on exami nation with a spectroscope* the absorptions appear to be about those of Fig. 2

The ratio of the exposures through the blue, green and red filters is ver satisfactory. If the blue require one second, the green and red will requir about 2½ or 3 and 6 or 7 seconds respectively. They will necessarily vary with each different set of filters, but the ratio 1 : 3 : 7 may be taken as a basis upon which to work, and with the dark blue-violet some workers employ this would still further reduce to something like 1 : 1½ · 3

A B
Fig 3

As regards the general ortho chromatic properties of the Homocol bathed plate, the accompanying illustration gives some idea (Fig. 3), though, as the reader is aware, such "tests" are very inadequate. A is the photograph of four strips of coloured absorbent paper taken on an ordinary plate; B is the same, photographed on a Homocol bathed plate, with a four times yellow screen A screen increasing exposure about eight times will give an almost full orthochromatic rendering, and thus, for copying oil-paintings, etc., the photo-engraver will find the dye useful

Now, a few words as regards development. The developer seems to considerably lessen the red sensitiveness, hence a fair amount of *real ruby* light may be used. I cannot recommend pyro-ammonia, not because of fog!—the plates are absolutely free from fog, provided the original unbathed ones were—but because it seems to act slowly. Pyro-soda, metol-hydroquinone edinol-hydroquinone all work satisfactorily, and all give negatives with good gradation and plenty of density.

Development should be carried out until all detail is out, and a thorough fixing given By this time the pink tint will have washed out of the film, and a clean, plucky negative should result, containing sufficient gradation to make it perfect for half-tone work

The Levy screen can be used in front of the bathed plates, and the half-tone negatives made direct.

Such then, are the characteristics of Homocol It is the dye which has given me most satisfaction, both in theory and practice, and the perfect constancy of the results is the greatest point in its favour.

* Messrs. Penrose supply an excellent pocket spectroscope which three-colour workers will find invaluable

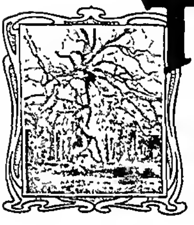
The Song of Spring.

Three Colour Prints from the Art Institute of J. Löwy, Vienna

From a Painting by Carl Zewy

ON SOME LIMITATIONS OF THE TRICHROMATIC PROCESSES.

By Frederic E. Ives.



A Gnarled Oak

Block by Gilchrist Bros. Photograph by J. C. Phythian

THE photochromoscope system of colour-photography, as worked out by the writer with Maxwell curve analysis and pure colour synthesis, has no material defect except that introduced by the defective scale of gradation inherent in photographic processes. Every other process of trichomatic photography is hampered not only by this defect in the photographic process, but by the introduction of other factors equally antagonistic to the realization of theoretic perfection.

Every nuance of colour can be satisfactorily reproduced in hue, purity and relative luminosity by mixtures of narrow bands of spectrum red, green and blue-violet, but if our white, instead of being made by a mixture of the isolated groups of spectrum rays is a mixture of all of the spectrum rays, pure colours must be made, in the reproduction, either impure, or else deficient in relative luminosity. The reason for this is that the relative luminosity of either of the pure colours is greater by the side of a mixture of the two others than by the side of a mixture of all the other spectrum rays. To give a specific illustration, the group of spectrum red rays between B and C will have a high luminosity value in comparison with a mixture of the green about E and the blue F½G, sufficient to make white if it were added to the red, but the same red will have a very low luminosity value in comparison with a mixture of all the spectrum rays outside of the space B-C.

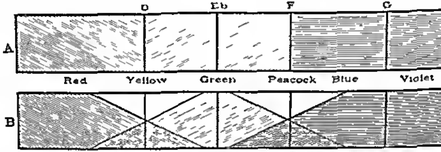
In order to preserve *luminosity* values in trichromatic process, whatever white we employ must *all* of it be divided up into three colour elements, and it follows that in the printing process, where our white ground is made up of a mixture of all the spectrum rays, if we would preserve absolutely the luminosity of the different colours as compared with the white, the entire spectrum must be divided into three equal parts to make our synthesis colours. There are two ways of doing this, illustrated in the following diagrams, A and B.

In A we have printing colours with sharply defined absorption bands, touching each other. In B we have printing colours showing the same total absorption, but with a graduated overlap.* Assuming a true scale of gradation

* See also the diagram illustrating my Traill Taylor Memorial Lecture, in which the dotted lines are Maxwell curves and the full lines overlap synthesis colours.

in the photographic process, either of these sets of printing colours could be used with Maxwell curve analysis and differentiate all hue and luminosity values, but with some degradation of purity of hue. If we use the first set, the purest and deepest reds must be represented in reproduction by an orange red reduced by black, whereas in the photochromoscope it would be a pure red—for we cannot obtain by the printing process any purer colour than the mixture of rays left after superposing two of the printing colours. It is not sufficient to say in reply to this that such pure colours are seldom found in nature; in my own experience I have often been expected to reproduce them in stained glass windows, woven fabrics and art objects—either these specific reds or purples and blues, in the composition of which an orange red cannot be satisfactorily substituted for a true red.

The second set of printing colours, if interpreted strictly according to the diagram, is substantially equivalent to the first; but unlike the first, these colours have a quality which may be denominated "flexibility." If we reduce the quantity of one, and increase that of another, we change the *hue* of the colour with less degradation of *purity* than when we use the first set of colours, because we not only alter the proportionate amount of absorption, but actually shift the position



of maximum transparency in the spectrum, provided that the colours are superposed in continuous films, as in my original lantern slide process For instance, the purest green would be represented by the superposition of the absorptions of the minus red and minus blue (peacock and yellow), and the maximum transparency in the spectrum would be about the E line Assuming Maxwell curve analysis in the negative making, a more peacock hue of green would be represented in the reproduction by an increase in the amount of the peacock ink put down, and a decrease in the amount of yellow, which with these colours, by extending the absorption of the peacock towards the blue end of the spectrum, and withdrawing the absorption of the yellow in the same direction, would displace the maximum transparency towards the peacock blue of the spectrum, without necessarily introducing any indigo-violet spectrum rays If, on the other hand, we employ the first kind of printing colours, there is no such displacement of the maximum of transparency in the spectrum, the green will be diluted as much with violet and indigo rays as with blue-green, and there will be no reduction in the transmission of yellow-green spectrum rays. All of the benefit it is possible to derive from this property of overlap synthesis colours can be obtained in the gelatine transparency process, but not in half-tone trichromatic printing, and it is for this reason, together with the greater purity and transparency of the colours available, that I have placed the transparency

process next to the photo-chromoscope system in the order of scientific merit.

Such overlap colours are brilliant yellow, and soluble Prussian blue diffused in gelatine slightly acidified with sulphuric acid. By varying the proportion of these two colours we may obtain various shades of green which are all practically free from admixture of either pure red or indigo-violet spectrum rays.* If we do not employ such overlap colours, we cannot modify our green without introducing either spectrum red or indigo-violet rays, which will degrade the colour at the same time that it alters the hue.

I would point out here that while the blue as above specified is suitable for this process, in combination with the brilliant yellow and a suitable overlap crimson pink, neutral or alkaline Prussian blue and the colour obtained by grinding up an opaque Prussian blue pigment in oil to make a printing ink, are *not* correct, and I have never advocated such colours, although Von Hübl leads his readers to suppose that I have done so. I condemned the ordinary Prussian blue printing ink for half-tone trichromatic process long before Von Hübl advocated anything different.

By the gelatine transparency process carried out with Maxwell curve negatives and overlap synthesis colours, I have made many transparencies all of which were quite free from the crudeness of colouring which Von Hübl complains of in the examples he has seen, made with a less scientific colour analysis and synthesis. Some of these, which were exhibited in Boston, nearly fourteen years ago, were then described in the *Boston Herald* as "exquisitely beautiful."

All this only brings me up to the point where the editor raises a question, which he asks me to answer. "Why cannot as good colour prints be made by half-tone trichromatic printing as by the gelatine transparency process?"

Of course there are many reasons, mechanical and otherwise, why equally good results *are not* obtained by half-tone trichromatic printing, in spite of the fact that the latter process is usually helped out by a considerable amount of skilful fine etching on the half-tone blocks; but one reason in particular is that, although overlap synthesis colours can be employed the fact that they are not superposed in films of varying thickness, but only put down in areas of fixed absorption, with clear spaces between, makes them act as only the first kind of colours would in the gelatine transparency process, without benefit of shift in the position of maximum transparency in the spectrum. It follows from this that the colours in the half-tone trichromatic reproduction would be duller and less true than can be obtained in the gelatine transparency process, just as the colours in the transparency are less pure than those in a photo-chromoscope reproduction; and that this would be true even if the printing inks were as true in hue and as transparent as the colours available for the transparency process

It is principally because this defect has been observed, without recognition of the true reason for it, that so many writers upon this subject have condemned Maxwell curve analysis in a wholesale way, when they found that a cruder analysis gave brighter colours in half-tone tri-chromatic process reproductions. Under all the circumstances, there is some justification for advocating a compromise in the analysis for half-tone process block printing—but it should be done intelligently, on the basis of a clear understanding of what is sacrificed in one direction in order to gain in another

My own experience convinces me that even in three-colour printing, the perfect differentiation of hues which is insured by Maxwell curve analysis is a

* The way in which the position of maximum transparency in the spectrum is shifted with overlap synthesis colours was explained in detail by Sir William Abney in *Photography*, May 9, 1901, p 312

quality so valuable and so highly appreciated by discriminating critics of the results, that we should make every effort to minimize other sources of error before jumping to the conclusion that a cruder analysis is practically better.

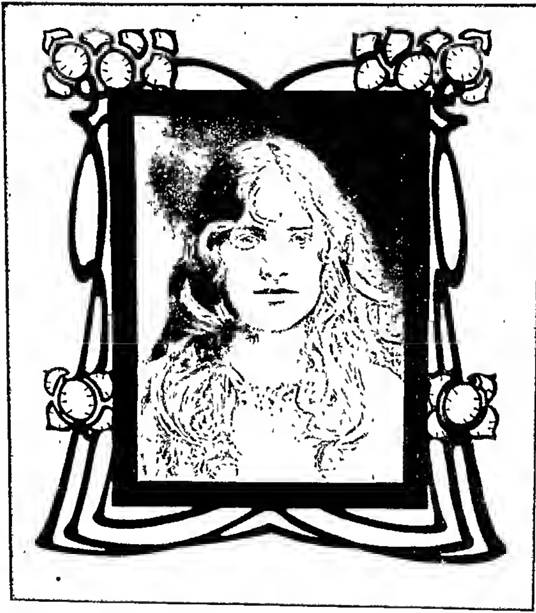
With half-tone block printing and inks which are not perfect either in hue or transparency, many subjects will require considerable fine-etching especially to increase the luminosity of some colours if Maxwell curve analysis is used, and especially to modify and differentiate hues if a cruder analysis is employed. I am assuming that the aim is to produce colour photographs rather than imitations of chromo-lithographs

Improvements in inks and printing will help to realize this ideal more than anything else, and in this direction there is now a ray of light, although it has not yet disclosed anything conclusive in actual practice. I refer to the introduction of Ullman's transparent varnish inks The most remarkable thing about these inks is not their unusual transparency, but the fact that by diffusing their colour slightly in the paper, in the manner of the well-known duotone inks, they give us, even in printing with half-tone process blocks, a considerable amount of the overlap blending which was previously obtained only with overlap synthesis colours as used in the gelatine transparency process. Some careful experiment is necessary to determine the best conditions for printing with these new, peculiar and most interesting inks, and as most printers are constitutionally indisposed to experiment, it may take a long time to determine conclusively just what gain may be realized by their use.

CHRISTCHURCH PRIORY

Block by
PHILLIPSON SON & SHILLETER

Photograph by
MARTIN J RIDLEY



"Curly Locks."

Block by
Gilchrist Bros

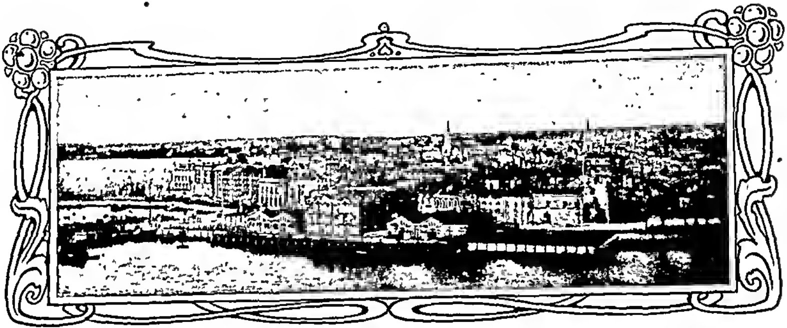
Photograph by
H. Coulton May

Dartmouth Castle.

Block by
The Meisenbach Co., Ltd

Ulmer's Smoke Black Ink.

Photograph by
Stephen Jarvis.



Southampton.

400 line screen. Combination Line and Half Tone by
Walker Engraving Co New York

Photograph by
F. G. O. Stuart.

Dorothy Drake.

H. B. Holding

THE IDEAL BLACK.

By H. B. Holding

(Binney & Smith Company)

Pretty Polly

Block by Wallace & Gilbert Photograph by William A. Taylor

IN gladly acceding to the Editor's flattering request for an article under the above title, it is advisable to say at the outset that the term "Ideal" is one which signifies the ever-receding unattainable, and that, just so soon as concrete or verbal expression has been given to any thought or idea, the object which was imagined to be the ideal becomes the real. Whenever perfection is considered to have been reached the process of stagnation sets in, and further development is impossible

There are very few directions in which such enormous improvements have been effected within the past few years as in black printing ink and the person would be deemed ignorant, indeed, who would say that we have arrived at the final stage in the evolution of even this commodity or that we had obtained the ideal black For years past our Firm have specialized in the production of the best black pigments and have always been and still are, experimenting for the purpose of obtaining the most suitable blacks so that the printing ink manufacturers may supply the very best qualities of ink and our experience proves that our makers at home are not behind their competitors abroad in welcoming and testing all new productions and eagerly adopting such of them as have proved to be beneficial even though this may entail the laying down of special machinery

Great advances have been made during the last decade in all details of the printer's art and no less in the density of colour and beauty of the black inks used and one has only to compare the illustrated and typographical productions nowadays with those a very few years ago to realize the steady progress made in this country which proves that whatever may be said about the lack of initiative on the part of the British manufacturers in general this does not apply to the printing-ink makers at home, who have shown an adaptability to the constantly growing demands of punctilious customers which is truly admirable

The use of all kinds of black inks has grown enormously within living memory (the increase for instance, in the number of newspapers, weekly reviews and illustrated magazines published having been phenomenal), and yet in every direction we see a tendency towards the production of the *best*, rather than the *cheapest* which shows that the once-popular craze for mere "economy" (with its accompaniment of bad workmanship and characteristic nastiness) is fortunately

on the wane, and this is noticeable not only in the inks for news and jobbing purposes, but in those for superior litho and half-tone work.

It would be an impossible task to describe, in the space at my disposal, an ideal black for every kind of ink, for it is obvious that what is best suited for one purpose will not answer for another, and the variety of inks (even black ones) is legion, but it may be interesting to set forth a few details in regard to some of the blacks used in the manufacture of inks.

Vegetable Black.

The term Vegetable Black is peculiar to Great Britain, and is used in this country to designate that kind of Lamp black which is obtained from the burning of creosote oil and other productions of coal tar, in contra-distinction to charcoal and other substances which are got from grinding. It enters into the composition of nearly all kinds of printing ink, as it possesses good flowing qualities and is easily distributed. The colour varies from a pale grey to a modified black, in proportion as the yield obtained from the creosote oil is reduced. So that to secure the best quality of Vegetable Black—especially where colour is the important factor—it is necessary to burn the oil very slowly and introduce into the flame a larger percentage of oxygen, which results in the consumption of a much greater quantity of the raw material than would be necessary if a poorer grade be desired. To improve the colour of even the best Vegetable Blacks thus obtained direct from oil, it is necessary to have recourse to a process of calcination, during which the impurities remaining in the pigment are eliminated. These two processes are very expensive, but so long as efforts are directed to trying to get density of colour from Vegetable Black alone they cannot be avoided. Finding, however, that a cheaper and a better plan was to utilize Carbon Black in conjunction with "vegetable" for improving the colour and giving body to the ink, we have established a factory in London for the purpose of making a quality of Vegetable Black specially adaptable to mixing with "carbon" and possessing a blue undertone. In the issue of the Process Year Book for the year 1898, I contributed an article in which I described some American blue-tone blacks used in the process of black-blending which minimises the need for Chinese and Prussian blues, in neutralising the yellow and brown undertones of Vegetable and Carbon Blacks. As one of the results of that article, a demand was created for this class of goods, and instead of importing them from America (as we formerly did) we now are making them in this country with very encouraging results.

Carbon Black.

So long as blacks for printing ink were obtained only from the cruder forms of creosote oil, it was a physical impossibility to economically get results which were other than grey or brownish, but when it was found that the smoke obtained from the burning of natural gas in America could be used for printing, a revolution was effected. Owing, however, to the enormous cost of this black, which is called Carbon Black (to make one lb. of which between 2000 and 3000 cubic feet of gas have to be consumed) it was some years before it could be generally used. Discoveries of large quantities of this marvellous natural product having been made, it shortly became possible to obtain Carbon Black at a cheaper rate, and now very few inks are produced which do not contain it in larger or smaller proportions, especially as this black is being sold at a price little higher than that which formerly ruled for best Vegetable Black. Owing, however, to the granular

formation of the pigment (which made it rather difficult to grind and to incorporate with the varnish and driers) it was found desirable to mix it with Vegetable Black, as the latter (owing to its foliated character) possesses better flowing properties Still, an ideal ink was not obtained, for, although the density resulting from this combination was infinitely superior to that from Vegetable Black alone, it was found that just to the extent to which the percentage of Carbon Black was increased (for the purpose of strengthening the colour) so the difficulty became greater of getting the ink to flow easily through the fount of the press.

Peerless Black.

It was to meet the need for an ink possessing all the brilliancy of Carbon Black with the flowing properties of "vegetable" that, as a result of innumerable experiments and large expenditure of time and labour, Peerless Black was placed on the market, and owing to its exceptional merits it has established a world-wide reputation. The process by which it is produced, being a trade secret, it cannot be expected that I should dilate upon the method of its production. Suffice it to say that it belongs to the family of Carbon Blacks, but, being specially treated, it is finer in texture and softer than any of its relatives. To make each pound of Peerless Black about three times as much natural gas is required as for ordinary Carbon Black, which (apart from its special treatment) accounts for the much higher price which has to be charged for it. We claim that Peerless Black is the most uniform and reliable of Carbon Blacks, excelling all others for making lithographic, half-tone and letterpress inks

1. It will not thicken or become pasty when ground in varnish or oil like other Carbon Blacks, allowing more black to be incorporated into a varnish and consequently producing an ink of superior working qualities, greater body, better covering power and more opacity.
2. It is the only black that combines the dense blackness and brilliancy of Carbon Black with the softness and working properties of Vegetable Black or Spirit Black
3. It mixes more readily in varnish than any other Carbon Black, and, not having so brown an undertone, requires less blue to fortify the black or neutralise the brown.
4. It is perfectly calcined and contains no grease or oil, which so often causes an ink to strike through the paper or interfere with its drying.
5. It is the only Carbon Black that makes an easy-flowing fluid ink which will flow readily down the fount of a press, and is therefore specially adapted for making inks used in fast presses
6. It will carry more black colour in a varnish or oil than any other Carbon Black and, by using Peerless, a maximum amount of colour can be pressed into a minimum amount of varnish, making a smooth, brilliant, solid, black ink.

The unsolicited testimonials we have received from printing-ink makers from all parts of the world (including the leading British manufacturers) amply bear out the above description of its exceptional qualities.

Carboline.

Our Firm are not, however, so vain as to suppose that even Peerless Black is the ideal one for every kind of process and other high-class artistic work, for we have recently discovered that for some of the particularly fine half-tone blocks (which, owing to the rapid advances in the photographic arts are now

produced of even finer quality than ever before) a new black—which we call "Carboline"—is superior. We, to-day, believe that Carboline is as near to being a perfect black for the finest grades of ink as can be found; certainly, in some directions, it far excels all its predecessors. From specimen printings made from half-tone blocks of the finest texture it has been demonstrated that for depth of colour, beauty of effect, consistency of gradation and excellency of light and shade, an ink made from Carboline more nearly approximates to the ideal than any we have yet known. It certainly deserves to transcend the ordinary or materialistic, for it is what is technically known as a Spirit Black, and just as in the Carbon Black series Peerless is in the van, so in the Spirit Black group Carboline leads.

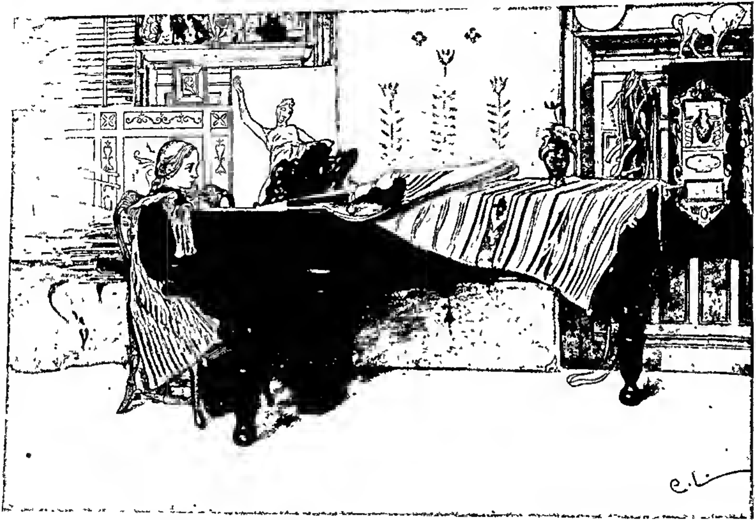
It remains to be seen whether our experiences with Carboline will be the same as was that with Peerless. Years ago some of the printing-ink makers thought that Peerless was too expensive to use, and that there was no room for higher priced inks. Since then it has been proved that the leaders in the printing world have encouraged the use of the better qualities of inks, with the result that the works at which Peerless Black is made have been more than twice doubled within the last few years.

Carboline is necessarily an expensive black, and it will be very interesting to see whether it is possible to create a demand for this new black similar to that of Peerless. It depends upon the actual users of inks. If they will make up their minds not to be satisfied with that which is now believed to be the best, but will demand even that which is better (being prepared to pay a fair price for it) there are those of us who, devoting undivided attention to the problem will constantly endeavour to give satisfaction, and ultimately make that which all may agree upon as the Ideal Black.

BEACHED

Block by
CHAS. W. HARNESS

Photograph by
S. L. COULTHURST.

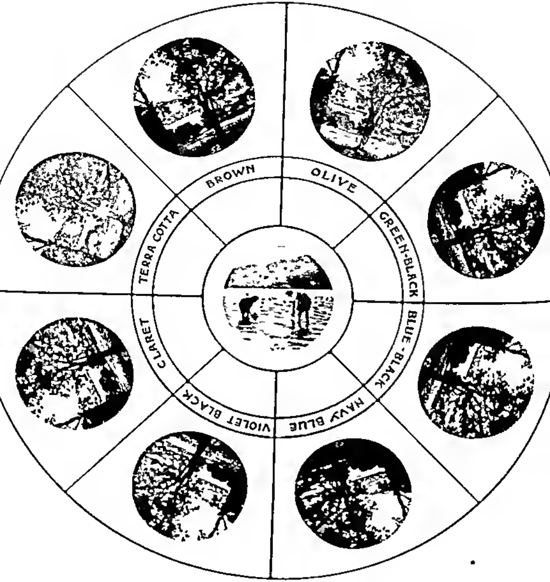


The Pianoforte Lesson.

By permission of the Editor Alb Bonnier from Larsons

Colour Blocks for Four Printings by
Justus Cederquist's Kemigr Anstalt Stockholm

From a Water Colour by



Colour Chart for mixing Half-Tone Printing Inks.

PRACTICAL COLOUR-MIXING

(With Special Reference to Half-tone Inks).

By C. G. ZANDER.

THE WOODLAND

Block by Chas. W. Harness   Photograph by J. C. Pythian

IT very often happens that printers are asked to print half-tone blocks in a subdued colour (so-called Art Shade) to match a given colour pattern supplied by the customer. If the printer happens to be established within hail of a printing-ink maker, he should have no difficulty in promptly obtaining an ink to match the particular pattern. If, however, he should be located in some out-of-the-way provincial town and the job be urgently wanted, or if perhaps only proofs be first required before any particular shade of colour is finally decided on, in which case it would not be worth the trouble to procure a supply of ink on chance, it will be found most useful if the printer is enabled to match any given colour (or Art Shade) with ease and precision from a limited number of stock inks. It is the purpose of this article to give concise instructions how to accomplish this easily and methodically.

Most of the readers of the PENROSE YEAR BOOK, I take it, will know that in theory any colour can be reproduced by mixtures in various proportions of suitable hues of red yellow and blue. In practice however, no printer, nor even the most skilled printing-ink maker would readily undertake to accomplish such a feat, even supposing there was no difference in the ultimate cost of the ink. Generally, for the purpose of mixing or matching, inks or colours are used of a hue which already more or less resembles the colour we want, and only require modifying by mixing with them other suitable inks or colours.

A thorough grip of the theory of colour-mixing, however, will make it wonderfully easy to utilize for our purpose such stock colours as are already half-way or nearer to the goal we are aiming at, and to modify them, not by rule-of-thumb, but scientifically with the assurance and anticipation that we shall accomplish our purpose without loss of time, money and temper.

The system which applies to the mixture of bright colours equally applies to the mixture and modification of subdued colours, or "Art Shades," as they are usually termed in the printing trade. The pure colours, that is the spectrum colours and extra-spectral purple or magenta, may, in their proper sequence be arranged in a circle when they will form a recurring range of colours. The principal ones are red, orange, yellow, green, blue (turquoise), violet-blue (ultramarine), violet and purple (magenta). I am not giving here any of the recognised scientific classifications of colour, but I am enumerating the principal

colours as they appear most characteristically different to the average observer. Moreover in practice, particularly for colour-mixing, it will be found most convenient to have eight principal colours arranged round a circle, so that the complementary colours should be placed at the two poles of a diameter. In the centre of the circle we place black, which results from mixing red, yellow and blue in suitable proportions according to the colour strength of the pigments used. Any two complementary colours (pigments) will also make black.

As in the present instance we are dealing with "Art Shades" only, which are really only bright colours subdued with grey, we will replace the pure colours with corresponding subdued colours or "Art Shades." The rules for mixing or modifying pigments apply in the same way to pure colours as well as subdued ones. We replace the eight pure colours enumerated, viz., red, orange, yellow, green, blue (turquoise), violet-blue (ultra-marine), violet and purple respectively by the following subdued ones: Maroon, brown, olive, myrtle-green, greenish blue-black, navy blue, plum colour and claret. This modified colour system is exemplified in the accompanying chart. The names given to these inks in the printing-ink trade are usually fancy ones, which may sometimes shock the scientist or artist, but these designations need not puzzle the printer. He will find no difficulty in identifying them with the help of the accompanying chart.

Having arranged our colour chart, the mixing and matching is comparatively easy. It must, however, be assumed that in every well-regulated printing office which is in the habit of regularly printing half-tone blocks in black and Art Shades, there is a range of at least eight of the principal "Art Shades" stocked, which should be similar in hue to those given in our chart. If not, these instructions will, of course, be utterly useless.

Presuming we have a subdued colour of a certain shade to match—for instance, a yellowish green-black—the following will be our proceeding:—

First try to localise the colour you have to match (if none of your eight stock colours match it) on the circle of our chart. This will not be very difficult, and after a little practice this identification, as we may call it, can be done mentally without reference to the chart. In the present instance, presuming we find our pattern colour situated on the circle between the green-black and olive, say, very near the former, it is obvious that the admixture of a little olive to our stock-green black should produce a match. If, on adding the olive to our stock green-black we find when proving the colour that it is lighter than the pattern, i.e. "lacks depth," as it is usually termed, there are two courses open to us to remedy the defect (provided the inks do not lack body or staining power in the first instance). The most obvious remedy is to add a slight proportion of black, say 1 to 5 per cent.—perhaps even less, but hardly ever more, will do. Another way of deepening the colour and one which produces cleaner results, is to add to our mixture a suitable proportion of the complementary colour, which in the instance mentioned would be "claret red." This latter proceeding of subduing a colour by its complementary is suggested by the fact that two complementary colours, *when mixed in suitable proportions, produce* grey to black (according to their density). In practice it will be found that the colour resulting from the addition of a little of the complementary colour will have a cleaner appearance than the colour produced from the admixture of black or grey.

If after mixing olive green to green-black, in the first place, the resultant colour is too dark, it is obvious that the addition of either varnish or white will produce a match—it will make a tint.

It is imperative that at the first onset you should correctly localise the

pattern colour you have to match. If, in the instance given above, the green-black you have to match should be situated on the right of your stock green-black, *i.e.*, if it be a little bluer in tone than the latter, and if you incorrectly identify it as being situated between green-black and olive, it is obvious that no admixture of olive will produce a match. Should you discover your mistake too late, *i.e.*, after mixing olive with the green-black, do not attempt to set it right by adding blue-black, the colour which you should have added in the first instance, for the result will be a very dirty nondescript colour, almost as if you had added black. Throw the mixture away and start afresh correctly—it will be better for you and your customer, not to mention the printing-ink maker. This points to a rule which it is well to remember in connection with all colour-mixing, bright colours as well as subdued ones. Do not use more than three colours for producing a given hue or shade, or the mixture will have a dirty tone. Two colours, if properly selected, should in most cases be sufficient.

Generalizing from the above given particular case of matching a certain green-black, we may summarise the rules for colour-mixing as follows:—

Select the nearest colour in the circle of the chart, modify it by mixing with it a sufficient quantity of either of the colours on the right or left (but not both) according to requirement. Deepen it if necessary with the colour situated diametrically opposite (*i.e.*, the complementary). Black can be used for deepening, but it is likely to produce a more or less dirty appearance. Reduce with white (or varnish) for paler shades or tints. Do not use more than three colours for producing any given shade, or the mixture will look dirty—two properly selected colours should in most cases be sufficient.

The printer who is used to doing three-colour work need hardly be reminded that photo-chromic yellow, red and blue may, with great advantage, be used for modifying "Art Shades"—they need only be used sparingly. Their position in our colour chart would be outside the circle of the subdued colours approximately as follows:—The yellow above and on the radius of the olive, the blue above and on the radius of the blue-black, the red above and on the radius of the claret. The addition of a little black to the photo-chromic colours will produce subdued colours and indicate their respective position in this colour chart.

A little reflection will show us that the photo-chromic colours can be utilized for matching "Art Shades" as follows:—

Photo-chromic yellow may be used for modifying
Terra Cotta.
Brown.
Olive.
Green-black.

THE BROOK

A winding brook
That babbled on through
groves and meadows green

Block by
ARTHUR COX
ILLUSTRATING CO
LTD

Photograph by
L. B. HINDLEY

Photo-chromic red may be used for modifying

Violet-black.
Claret.
Terra Cotta.
Brown.

Photo-chromic blue may be used for modifying

Green-black.
Blue-black.
Navy Blue.
Violet-black.

Taking the eight stock inks of "Art Shades" seriatim, the following will be the rules for modifying them in order to produce matches of certain given "Art Shades".

CLARET.—Modify with either violet-black or terra cotta. Deepen with green-black.

TERRA COTTA.—Modify with either claret or brown. Deepen with blue-black.

BROWN.—Modify with either terra cotta or olive. Deepen with navy blue.

OLIVE.—Modify with either brown or green-black. Deepen with violet black.

GREEN-BLACK.—Modify with olive or blue-black. Deepen with claret.

BLUE-BLACK.—Modify with green-black or navy blue. Deepen with brown.

NAVY BLUE.—Modify with blue-black or violet-black. Deepen with brown.

VIOLET-BLACK.—Modify with navy blue or claret. Deepen with olive.

Note.—For deepening, black may be used in each case, as already mentioned. In place of blue-black or navy blue the ever-handy bronze blue may be often used with advantage.

The eight stock colours used in printing the colour chart, and of which only the general names are given therein, are the following (Fleming's):—

Claret	1208 Corinth Red.
Terra Cotta	1296 Bartolozzi Red.
Brown	1239 Art Brown.
Olive.	1209 Olive.
Green-black.	1205 Green-black.
Blue-black.	1315 Blue-black.
Navy Blue	1211 Blue-black.
Violet-black.	1310 Violet-black.

After a little practice it will be found that with the aid of the above-mentioned eight stock colours and black, any given so-called "Art Shade" can be easily and exactly matched by any intelligent printer, and often much valuable time may be saved.

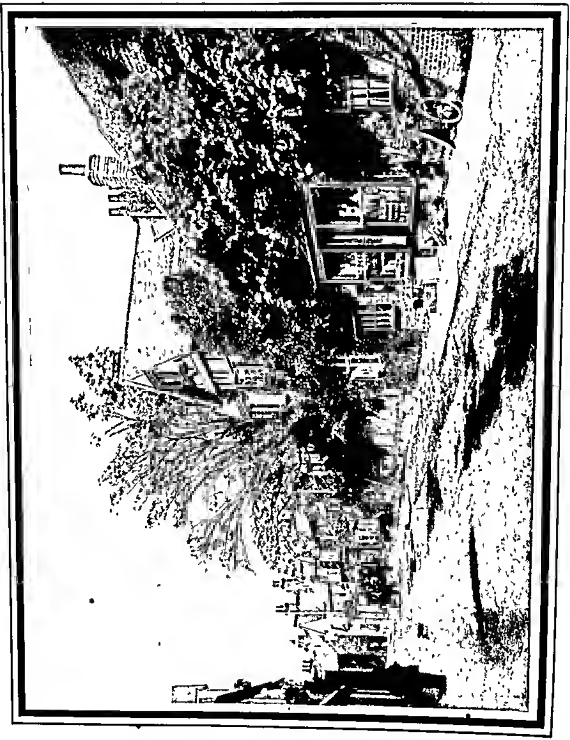
Block by
GILCHRIST BROS.

A GREAT WESTERN EXPRESS

Photograph by
H. C. [illegible]

A Lothian River.

Design, Photograph and Block by
Archibald & Fowler



Little Sorrow.

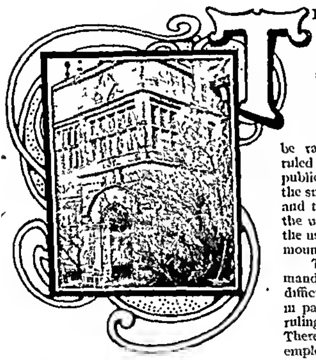
I'm too sore at heart to play
Woe's me' said little Sorrow.

Block by
Walker Engraving Co
New York

Photograph by
Catherine Edmonds

SCREENS FOR COLOUR WORK.

By Max Levy.



The Hall i' th' Wood, Bolton

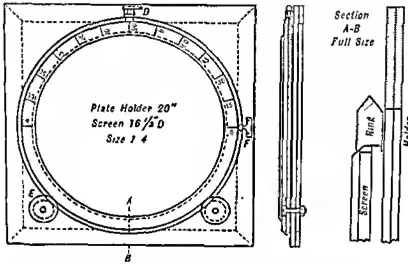
Block by Hood & Co Ltd — Photograph by J W Tootill

THE rapidly increasing interest in colour work prompts me to write again on the subject of the characteristics of screens best adapted to that purpose. In a former study of the subject in the Process Year Book for 1898, entitled "Screens for Three-colour Work," the balance of advantages was shown to be rather in favour of a pair of screens ruled at the proper angles. Since the publication of the article above referred to, the subject has been still further developed, and the new facts have tended to discredit the use of a pair of screens, and to favour the use of a screen of circular form, properly mounted

The increasing sizes of the plates demanded in three colours impose greater difficulties than ever in the use of screens in pairs, and the increasing fineness of the rulings employed adds to these difficulties There is manifest a growing tendency to employ four colours instead of three, and this practice seems to afford advantages both artistic and economic; for such work the circular screen is to be very greatly preferred, if not regarded as indispensable The circular screen can also be employed most advantageously for double printing or "duotype" plates, where the best results are obtained by making one of the plates (the secondary) with the lines parallel with the sides (or horizontal and vertical as they appear in print), and the primary plate (the stronger or key colour) with the lines diagonal to the sides The circular screen (if otherwise normal) can also be employed advantageously for the usual black half-tone work

The advantages offered by the employment of a screen of circular form, as indicated above, have stimulated the efforts to minimize the disadvantages which have been found to attend this form of screen Only two objections have been urged against the circular screen, one, the difficulty of turning in the holder or camera, which is purely mechanical and can readily be overcome, and when overcome in the manner shown below, affords a further advantage over

any other existing method in the complete protection of the screen from the silver solution, and the larger measure of further protection from accidental injury through jar or other causes. I have recently designed the arrangement shown in the drawing, and have constructed a special lathe for turning the aluminium rings up to 72 inches in diameter. In this arrangement the screen is carefully fitted and cemented into a ring turned from an aluminium casting, and this ring is arranged to rotate upon two friction rollers and a friction clamp, all of which are mounted upon a framework carefully built up of sheet aluminium and properly braced. The ring is graduated half-way around, the gradations being 15 degrees apart, and a pointer is mounted upon the framework by which the angle is read off. The direction of the rulings is carefully marked upon the screen, and one of these rulings is made to conform to 0° and 180° on the circular frame. A screen 40 inches in diameter, made for my exhibit at the Louisiana Purchase Exposition (St. Louis, 1904) is mounted in this manner, and moves



with the greatest possible freedom and precision, so that in using such a screen there need be no fear whatever of any error in the angle of the rulings in resulting plates.

I shall now take up briefly the chief obstacle in the way of the use of the circular screen: this is the extra large size of camera and plate holder required. The effect of this disadvantage is reduced by placing the screen in the camera instead of in the holder, the former being the English and Continental, the latter the American practice. I am able to say at this time that the difficulty is substantially, if not entirely, removed by an ingenious contrivance I have seen, in which a plate holder of the normal size for the required plate is employed in connection with a circular screen and framework considerably larger, the screen and framework being mounted in the back of the camera with ample provision for cleaning the screen without removing it from the camera. I am unable to give full particulars of this device at present, as the inventor is not yet ready for publication.

A DANGEROUS TENDENCY IN PHOTOGRAPHIC ILLUSTRATION.

BY W. I. SCANDLIN, NEW YORK.

MY DOLLY

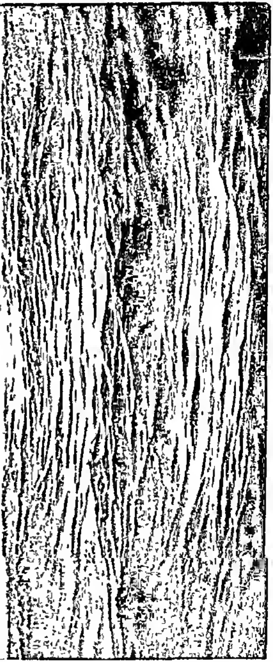
Block by GEO NEWNES LTD. Photograph by CHAS SWEET

THE love of pictures seems to be almost universal, and the facility and accuracy with which photographic illustrations can be made to-day is widening the field of their usefulness in almost every walk of life. The application of photography to the printing press through the medium of the half-tone plate and coated paper has opened up a commercial field for it, which until a few years since had scarcely been dreamed of. I refer particularly to the use of photography and the half-tone plate in their application to display advertisements. It is a well-known fact that there are to-day in almost all our large cities firms of advertisement builders, who derive their entire income from skill and taste and display in adapting photographs from life and nature to use in their advertising announcements.

Our magazines and illustrated papers are full of examples of this work, some good, some bad, and some only indifferent. Of the good, it may be said scarcely anything can be better than a strongly worded, grammatically constructed paragraph or group of paragraphs, illustrated with pictures that bear upon the subject matter of the announcement, and that go to strengthen or illuminate the body of the text. Of the indifferent, it is hardly worth while to speak, while of the bad, there is, in the opinion of the writer, ample evidence to be found in almost all directions that a growing tendency is developing which should be speedily suppressed. This tendency is towards the use in advertising announcements of such pictures as go to degrade or shock the moral sentiment of those who read them.

It is, of course, true that a well-posed photograph of a handsome female figure, fashionably gowned or draped may embellish and beautify almost any page. But the time has apparently come when this is not enough, and the alleged "artist," who perpetrates much of the matter referred to under the above class, seems often to out-reach himself in an endeavour to make his illustration suggest a double motive. There is much in advertising illustration to-day that savours of unhealthfulness from a moral view-point. That it is beginning to attract attention to itself is a good sign and one that should be welcomed by all who have the welfare of the community at heart.

This question was lately brought to a practical issue in New York, and the issue squarely met by Mr. Stephen H. Horgan, Art Editor of the "New York Tribune."

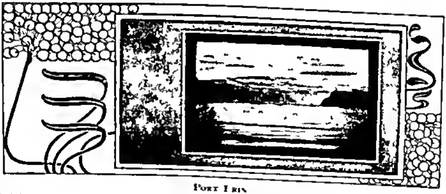


The matter is covered by the following article which appeared in a recent number of the "Inland Printer;" one of the leading organs of the printing and type industries of this country. In this article Mr. Horgan says:—

"The editor of this department was called upon recently to settle a dispute between an advertising manager and the editor of a metropolitan newspaper. The question was as to the fitness for publication in half-tone of a photograph supposed to advertise a corset. The picture was of a most voluptuous looking woman, photographed in her boudoir wearing the corset over a specially short petticoat, while a maid was presumably fastening her slipper. A special effort had been made in the woman's pose to make her anatomy from the bottom of her petticoat down the conspicuous feature of the picture. When I decided against the reproduction of the photograph the advertising manager became furious. He demanded to know what the rule was that decided the unfitness of a picture for publication. Pictures, he said, were printed of South African women and other aborigines almost nude, chorus girls, acrobats, trapeze performers in tights, and bathers in all manner of poses. Then why object to this corseted woman? The exact dividing line between decency and indecency is not easily drawn, still I was compelled to quickly formulate an answer to this advertising manager and it was as follows:—'Photographs of human beings in costumes or poses in which they would not appear in public are liable to be unfit for publication in an ordinary newspaper.'"

Aside from the very decided objection to laxity in this regard on the ground of its effect upon the morals of the communities in which the questionable illustrations are allowed to circulate, there is liability of damage suits and legal actions that far over-balance any real benefit from their use.

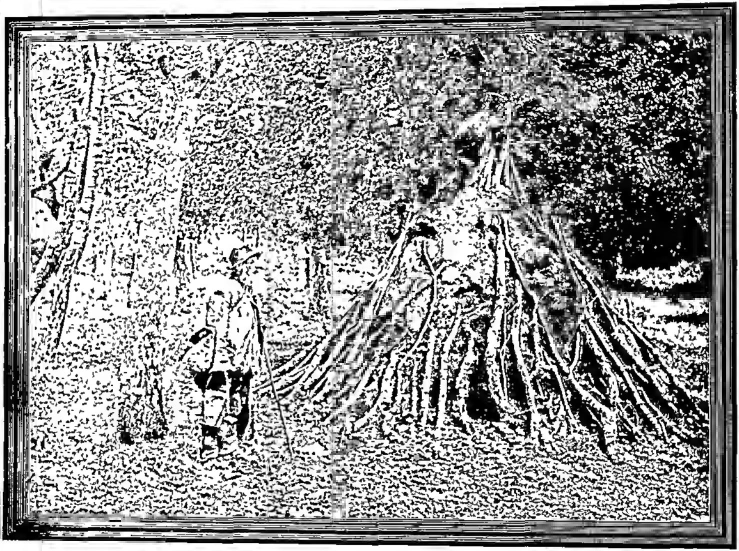
It is earnestly to be hoped that publishers, advertisers and the press throughout the world will look at the matter seriously, and do what is possible to prevent the growth of this pernicious tendency.



PORT ERIN

Block by
Geo. Newnes Ltd.

Photograph by
H. Allen Graves



The New Forest Snake Catcher.

Block made with 200 line screen by
Walker Engraving Co
Border ruled with Royle's Lining Beveller

Photograph by
F G O Stuart

Block by
A Bourne & Co

Branksome Chine.

THE LONG LAKE

Photograph by

South Country Views.

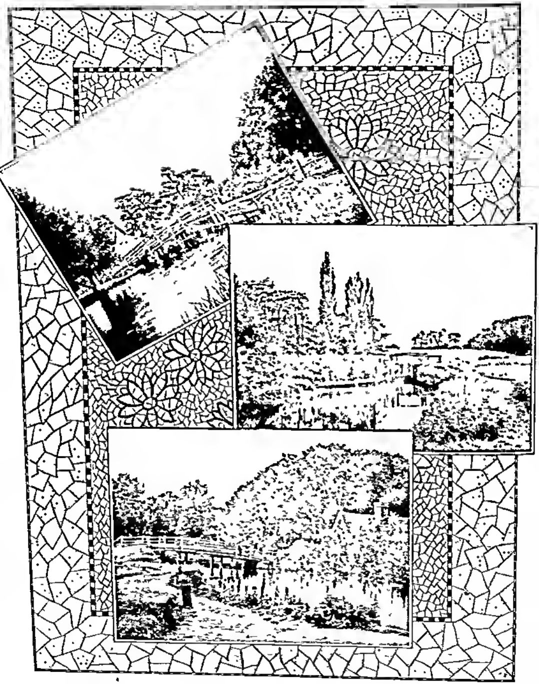
Cottage Studland
Dovedale Derby
In the Pines Bournemouth

Block by
The Art Reproduction Co. Ltd

Comus Valley near Ludlow
Mill Street Weir and Bed Walk from Whitcliff

Cottage near Bournemouth.
The Mill Wheel near Swanage
Cottage at Iford

Photographs by
Martin J. Ridley

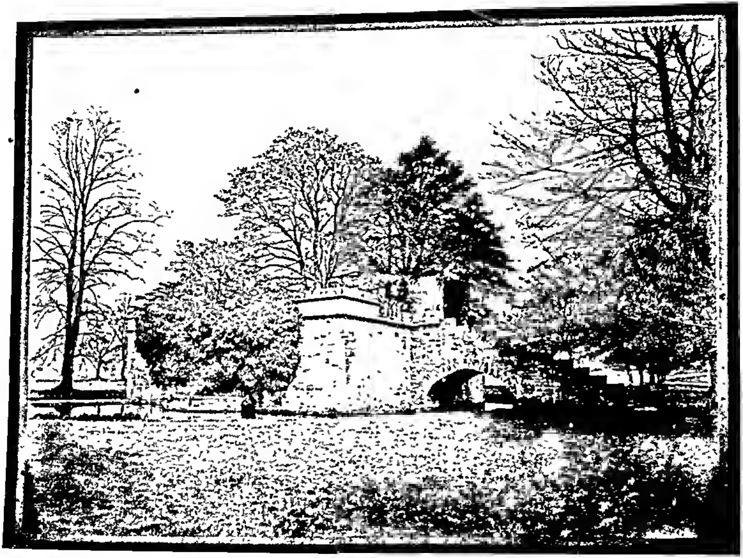


Rural England.

An Old World Bridge — Flatford on the Stour — On the Stour.

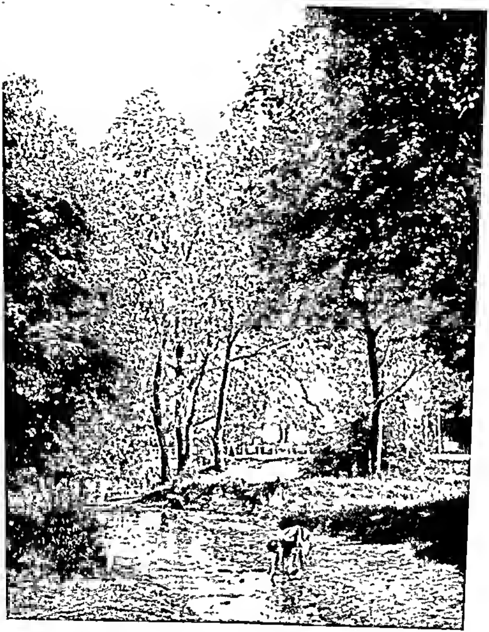
Block by
Vaus & Crampton

Photographs by
S. L. Coulthurst



Queen Mary's Bower, Chatsworth Park.

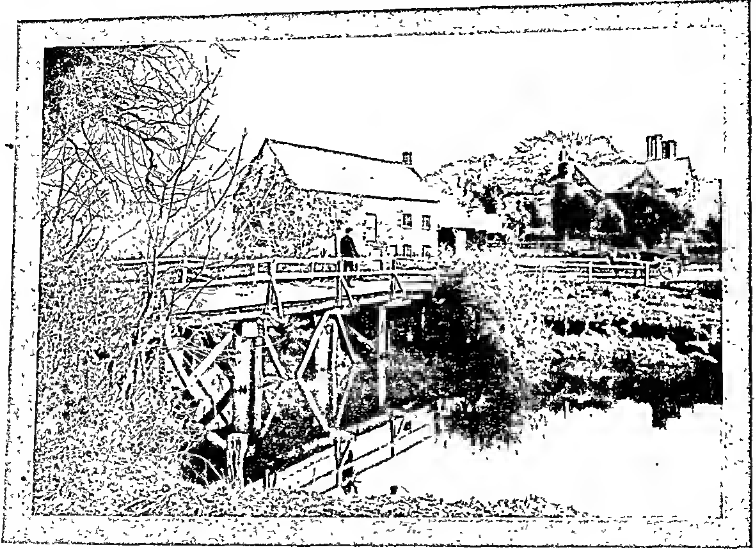
Photograph and Block by
Pawson & Brailsford



An Austrian Landscape.

Copper Engraving by
C. Angerer & Goschl, Vienna

Photograph by
Joseph Holzer, Vienna.



Haywood Mill.

Block made with 200 line screen by
Walker Engraving Co New York

Photograph by
F G O Stuart

Waterfall, Chatsworth Gardens.

Photograph and Block by
Pawson & Brailsford

La Campiña.

(The Country)

Colour Blocks for Four Printings by
Blanco y Negro Madrid

From a Painting by
Emilio Sala

TOPICS OF INTEREST TO PROCESS WORKERS OF THE OLD AND NEW WORLDS.

By HERMAN J. SCHMIDT.

Block by
De Reproductie Co

HOW time flies! Here we are nigh on to the year 1905, and it seems but such a short time since I returned from Europe, yet is it nearly four years full. I confess I am lazy when it comes to writing, but as I have not contributed to the PENROSE YEAR BOOK since 1901, I feel it my duty to do my mite in helping such a splendid publication along. The YEAR BOOK is an English enterprise and will continue to be such, notwithstanding that my countrymen in the U.S.A. have made really earnest attempts at getting one up, but so far without it materializing. Considering our population the craft is poorly represented in America from a literary point of view. We have one solitary trade journal that endeavours to cover the field, and that is the "Illustrator and Process Review;" it is a journal of real merit, but the craft does not seem to lend it support. There is another journal called the "Criterion," which is an official organ of the trade union, but it devotes its pages to business rather than to process matters. Business in America is very good, and as I am continually in touch with process engravers all over the world, the reports that come to me are up to date. The Association of Photo-Engravers, a body composed of the employers of various cities in the U.S.A., have evidently given the thing up. It is deplorable that such an association cannot hold together and live, and it is high time that some steps were taken whereby better prices can be secured for work. With wages going higher and higher, and material and chemicals likewise, while our prices are as low as 30 cents (1s. 3d.) minimum for line cuts, and half-tones 50 cents (2s. 1d.), the lot of the employer is not an enviable one.

These are rare cases, but that such prices really do exist is a fact nevertheless, and low as these figures are, they are far above those that some European engravers experience. I have circulars from Germany offering to do line work for a 15 cent (7½d.) minimum, and half-tone for a 30 cent (1s. 3d.) minimum, and this from Berlin. The regular price for line work is from 60 cents (2s. 6d.) to 80 cents (3s. 4d.) on zinc, and about $1.50 (6s. 3d.) for copper line work, this being for minimum cuts. Half-tones vary in prices according to the fineness of the screen. Newspaper half-tones of 65 to 100 lines to inch 75 cents (3s. 1½d.) to $1.00 (4s. 2d.) minimum. Then from 133 to a 200 line screen all goes on copper rising in price till a minimum of $3.50 (14s. 6d.) is reached, many getting 35 cents (1s. 5½d.) per square inch in New York. All extra work, hand tooling, vignetting, etc., is charged at the rate of 75 cents (3s. 1½d.) an hour. Now, it must not be

without making it any more so; another says too expensive; and another says he won't work with anything that he doesn't know the formulas for, and so on. It amounts to this much, that our operators find they cannot keep their rooms clean enough for emulsion work, and if a process worker saw some of our American shops and their arrangement he would perhaps believe it. Very little attempt is made at cleanliness in America. Some of our shops are up some dingy floor with scarcely any daylight; space is too expensive and everything is crowded to its utmost. Where etching, photographing, routing, mounting, proofing is done all on one floor, can you imagine much cleanliness in such a place? There is no such provision made in our shops as there is in European studios for perfect light, ventilation and plenty of space. Yet, withal, wonderful work is turned out from American shops. Whenever I get to make negatives I always wish for a Penrose Camera and Holder; we are strangers to such perfect gearing and adjustments in the holders. We have many shortcomings in the way of up-to-date apparatus, and I have wished Penrose's was in New York instead of London. Those process engravers who have never been in Europe don't know these things; to them anything is satisfactory, they don't know any different. I have many good reasons for getting discontented at times; when one has once seen Europe one realizes that there are other countries than the U.S.A. on the map, and where I once considered Europeans slow I have come to the conclusion that this slowness is only an imagination and not a reality. Such views were mine four years ago, but since then I have learned several things In some firms many attempts have been made to use dry plates for half-tone work both for black and colour work, but they found that they could not get prints good enough from such negatives with the glue process or the albumen ink process. These people forget that the dry enamel powder process is just suited for dry-plate negatives, and some firms are using the dry process on all their work made with dry plates in some European shops, *in fact, they only use dry plates. Take the house of* Delgeur Bros., Rotterdam, Holland, all negatives are made from dry plates, and printed with the dry process Operators here say that they cannot get perfect opacity in the high-lights and clear glass in the shadows, that may be true to some extent, but they will be successful in every respect if the dry process is used on them

LIBRARY OF TRINITY COLLEGE, CAMBRIDGE

Block by ACME TONE ENGRAVING CO

Photograph by GODFREY BINGLEY

There is the firm of T. W. Lascelles, of London, using nothing but dry plates, and they are using the regular glue process on them, so the plea that dry plates are not of a commercial value in half-tone making is a very poor one; practice is all one needs This applies to collodion emulsion as well In trichromatic

get the very best by all means, then you see that you have the proper powdering brushes, usually fitch hair (Penrose has them in stock), also etching brushes, but of the two your powdering brush is the more important. It must have a bevel to it so that the powder cannot be brushed away from against the side of lines; no matter what angle you hold your brush the bevel prevents this. Now for the first etch: Make a bath of nitric acid and water, a 5 per cent. solution at first (on a small scale, say, water 20 ounces, acid 1 ounce); put your plate into that and rock your tub gently for about two minutes, brushing very gently, just enough to remove the oxide from the plate. If the lines of your plate are very fine two minutes will suffice, but if it is coarse work another minute will improve it. An experienced etcher does not gauge himself by time, but I am giving you as near a gauge as I think about right. Now wash the plate well under tap and dry up all water from the plate, using chamois for that purpose. Dry the back as well, and then warm it over a gas flame. This is a rapid method, mind you, and I am giving you the ways and means to attain speed. Should occasion arise, in order that you may not get confused in which direction you powdered, it is well to mark the plate in some manner till you get accustomed to the system; the top you make 1, the right 2, the bottom 3, the left of the plate 4. Scoop up on your plate some Dragon's Blood and begin at number 4. Always brush the powder from the left of the plate towards the right, thus from number 4 you powder and brush against number 2, you have to brush over about a dozen times. Be sure that no powder remains on the plate except against the sides. You now take your pincers or pliers and hold it over a gas flame direct till the dark red powder has turned black and the red colour is lost, do not heat much beyond that, as it may spread too much and cause a shoulder in your next etch. After you have burnt in for the first powdering you lay your plate down on a stone slab to cool. This is not quite rapid enough for some etchers, so the following is usually the means adopted to cool plates and make time. A roller covered with felt is fixed into a box which holds water, the ends are cut out to allow the roller to dip into the water, half the roller being out and the other half submerged in the water. You put the hot plate on this roller and draw it towards you; this causes the water-soaked felt to strike the back of your plate and cool it off in five seconds. Roll the plate towards you several times, then dry the back and it is ready for the next powdering; this time you powder from number

THE DANCING LESSON

Block by THE WALKER ENG. CO. NEW YORK

Photo by CATHERINE EDMONDS

that is because they have never had occasion to get acquainted with the process. Just see the first and greatest advantage—you can see your print and its quality during development, and can proceed as far as you like, stopping whenever your print seems right ; you are master of the situation. Now the glue process differs ; you develop in water, and if your print is not right all that labour is wasted, is it not ? You cannot open up a dark shadow or lighten the sky in the wet process, but you can when dry development is used in negative making ; you must have a perfect negative for the glue process. If by chance your exposure on same is not right, for instance, your high-lights join and tail together, and your dots in shadows are very thin, you cannot intensify them ; that means closing up your high-lights more, doesn't it ? The printer might be able to get a print, but can he risk an exposure of ½ minute sunlight ? No, sir, he cannot ; the enamel would not hold on the metal in that short exposure, and it would all wash away. He prints it longer and the shadows get solid black ; that never happens with the dry developing process, you can give a negative that has high-lights joined a short exposure and keep on developing and reducing the print till your high-lights are broken off all across lines, and each dot is isolated nice and square, and your shadows open as well The enamel is very thin which is used in the dry process, and that is why this can be done There is no glue of any kind in it, it is little thicker than water, that's all. Yet, withal, the enamel never comes off in your etching bath. Never, even though pure acid is used when etching zinc, try to make your fish glue so thin. It will no doubt give you better prints, but, then, see where you are, as soon as any etching mordant is put on it off comes the enamel, so therefore fish glue must be quite thick to overcome this. Think what an advantage it is to use one dry developing system on all your work, line or half-tone, and it can be used on a screen negative from a 65 line to a 400 line if you need to. The absolute permanency of the enamel in the metal is the wonder of all those that are using it. Now we come to another point, and that is the amount of heat needed for the fish glue process to burn in a plate It will be interesting to those engravers that have been having trouble with zinc being rendered brittle by burning in to know that the enamel used for the dry process needs less than half of the heat that glue enamel needs, and on account of this, plates etch smoother and deeper. In shops in America many use zinc on fine half-tone work, and printers usually strip half-tone line and tone work on a flat and print them all at once. The line work stands the whole three or four

DORMICE

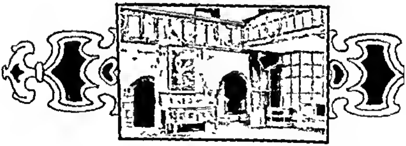
Block by
GEO NEWNES LTD

Photograph by
HERMANN LEA

1 to number 3, number 1 being the left side and 3 the right, always from left to right; repeat same operations as for first powdering and continue till all four sides have been powdered. The third time around would be from number 2 to number 4, and 2 being your left again and powdering towards 4 your right of the plate. The last powdering is from number 3 to number 1, and 3 being your left and one your right. After your last powdering your plate goes in for the second etch, which is a 10 per cent. solution of acid, 5 more being added to the first lot. Your etching time is from 3 to 5 minutes for the second etch. By using a good eyeglass one can soon acquire the knack of knowing when "time is up;" you can see a dark red spot on the side of your zinc against your lines that you have just protected in order that the acid may not undercut. As you go along in etching the line gets thinner and thinner till your Dragon's Blood line seems to be almost gone, and your acid is straightway eating the metal away close to the work, then you take it out. If you don't go beyond 5 minutes on your second etch in a 10 per cent. solution you are perfectly safe. You dry your plate again and prepare for the third and usually the last etch. You go over the routine as before, and add another 5 per cent. acid, making it in all a bath of 15 per cent. strength on last bite. The time of the last bite is 8 to 10 minutes, but if you see the plate can stand more, use your own judgment.

The above, however, will be as a rule enough guide for anyone. The plate is then washed off in whatever way one is used to, and is ready for the router. Three "bites" are all that our commercial line work gets. The routing in the U.S.A. is the very best of any that I have seen, and the plates are routed out quicker than they could be etched to the same depth. When giving a plate four etches, as many do, it is good policy to dump out your bath and make a new one after the second etch, as the bath becomes worked out and etches very slowly on account of the zinc in it, which oxidizes the plates to a great extent and retards the action of the nitric acid. In order to attain perfect results the following points must be observed in line etching. See that you get a good gas

deep etches without the enamel ever giving way in any part. The
cleaned, proofed, etched again here and there, and the enamel cannot
in any way. After your plates come back from the printery you will
the enamel is still on after a run of 50,000 to 100,000, and that means r
out of the cut. All in all, I say this much (and I speak from 19 years'
ence), the dry developing process is fully 100 per cent. better, surer ar
than any I ever had experience with. That means that it is super
following methods :—First we had the albumen process, then the bitum
gum arabic process, fish glue process, cold enamel process and the blu
and it has been my lot to have experience with each. I have been n
quiries of several firms the reason they abandoned dry plates. Their
that they cannot find a method with which to get prints on the metal.
let me say that the dry process will overcome all those difficulties
Penrose will, as always, oblige anyone wishing to know about the di
by giving them my address. I have been asked to go to various places
to teach the system of process engraving as practised in America, and
likely that I may again come and visit European firms and assist the
way that may be needed. It is not conceit or vanity on my part to de
always try to help the craft and be of some service to them as I have in
Process engraving is my whole life, and I mean to devote as much of m
it in the future as I have done in the past. I now close, wishing th
engravers all over the world a Prosperous New Year.



THE BANQUETING HALL, HADDON

Block by
THE SOUTHERN CITY ILLUSTRATING CO. LTD

Photograph by
GEO. E. BROWN

A Retainer from Dhai.

Three Colour Blocks by
The Menpes Press

Illustration from "The Durbar" by
Mr. Mortimer Menpes

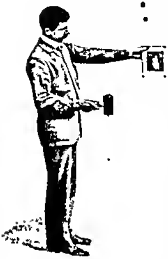
A Portrait Study.

Blocks for Two Printings by
The Strand Engraving Co. Ltd.

Photograph by
Adolph Langfier

THE SINOP COLLOGRAPHIC PROCESS.

By JOHN P. GLOVER.



THERE'S A PICTURE!

Block by Glasgow Photo Engraving Co. Photograph by John P. Glover.

FACILITY in the production of prints from the negative of the amateur or professional photographer is a desideratum; but a method of turning out an unlimited number of fine photograph-like ink prints, with simple apparatus and comparatively little trouble, is a boon the reader will be wise to consider carefully with me in the description which follows. I am painfully aware that I am addressing men of wisdom and experience in the process world, but let it suffice that this purports to be a detailed and careful description, by following which the tyro or the expert may alike attain complete success.

Messrs. Penrose recently placed on the British market a neat and effective outfit called "Sinop"—the title as ingenious as the apparatus! It consists, as indicated in the illustrations, of a strong neat box with handle, containing colloid plates, printing papers, a machined iron platen with hinged frisket, ink slab, roller, etc., etc. Not a complex outfit, and yet capable of turning out admirable results, as it has done in mine and other hands.

If I have succeeded in firing your curiosity, we will proceed with the theory on which the process is based, and which does not differ from that of the ordinary Collotype The colloid plates supplied are of glass, thickly coated with prepared opalescent gelatine. On bichromating these and exposing behind a negative, and after a short after-washing, the image stands in relief on the plate, composed of gelatine composition rendered soluble and insoluble in the lights and shadows respectively. On passing over the damp plate a roller charged with greasy ink, the soluble parts of the colloid plate, by virtue of their charge of moisture, refuse to take the ink; whilst the hardened portions corresponding to the shadows of the picture take the ink in varying degree, accurately reproducing the delicate gradations of the original. The secret of the success of the process lies in the fact that the inventor of the "Sinop" plate has concocted an emulsion superbly adapted not only to reproduce *with softness* the delicate details of the subject; but also with the quality of retaining sufficient moisture without danger to the coating. Now we will strip up our sleeves and proceed with the practice.

Reversing the Negative.

The colloid plate being a positive made from a negative, it is evident that the final paper print will be reversed. For many subjects this does not matter, but our lady friends, for instance, would strongly object to our depicting them with a wedding ring on the right hand; and so with architectural and other subjects, it is necessary to reverse the image. Unless it is desired to use an existing negative, a simple method of obtaining a reversed negative is to place a plate in the camera with the plain glass side toward the lens. Of course, it is necessary to adjust the focus, and the writer often uses this method, simply reversing the ground-glass focussing screen before operating. The exposure is then made *through* the plate, and developed as usual.

If film negatives are employed, reversal is not necessary, it being quite sufficient to print through the celluloid film. The consequent diffusion is not very considerable, especially if printing be conducted at the bottom of a blackened cardboard box, a method which materially increases the sharpness of the impression.

Another method is to make a glass transparency from the negative by contact, and to make from the transparency a reversed negative over the optical (enlarging) table by daylight or artificial light. This method is advantageous when it is desired to alter the scale of gradation, as also in the frequent case where enlargement or reduction is required, or where it is desirable to introduce clouds by combination printing.

Since we have a choice of so many methods, each peculiarly adapted for the obtention of special effects, it will be well to mention another very easy and effective way, which is simply to make an untoned print on glossy printing-out silver paper, inserting clouds, etc., as desired, and printing only to light proof depth. The print is then quickly copied before the camera, the sensitive plate being reversed in the slide as in the first method outlined above.

We now come to the means usually employed, which is not half so risky as it looks.

Stripping the Film.

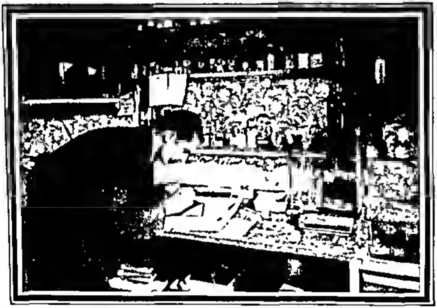
The dry negative is laid on a level pad, and the film cut through with the point of a sharp knife, ruling the incision about a quarter of an inch from each edge of the plate. The negative is then soaked for a few minutes in cold water and placed in ten per cent. Formalin solution for ten minutes. After rinsing, immerse in five per cent. Sodium Carbonate solution, and after a short rinse again, place in two per cent. Sulphuric acid. With a little gentle humouring, the film will leave the plate, and it is then reversed and laid down on the same glass plate under clean water. Airbells are removed by means of a flat camel-hair brush passed over the replaced film under water. If reduction of the film is required, this is easily obtained by immersing for a moment in Methylated Spirit. The reversed negative is finally dried. The above operation is depicted in our illustration.

Though I have not as yet been able to try the experiment, I would suggest that probably the making of a reversed negative can be obviated by printing from the original negative, through the back of the celluloid colloid film which is now obtainable. But possibly the half-tones would be lost.

The reversed negative may be placed in a retouching frame, and titled in small block lettering with "Process Black," using a fine mapping pen. The lettering is not reversed, and the operation is therefore easy. On the finished print the title then appears white.

The Sinop Colloid Plate.

Having obtained the reversed negative, which should be rather *soft*—about the quality known as a "bromide negative," and giving a light P.O.P. print full of delicate half-tones—we proceed to sensitize the colloid plate. This, as before stated, is a glass plate bearing a thick gelatine coating, which remains



Stripping the Film

opalescent throughout The plate is simply immersed for three minutes in a two per cent. solution of *pure* Potassium Bichromate. As the operation renders the plate sensitive to daylight, it must be conducted in gaslight, when the plate is drained and dried within about four hours for the best results If sensitized in the evening, the plate may be placed in a warm room to dry, as gas or lamp-light, if not too near, will not affect it. The sensitive plate should not be used until a full day after sensitizing, and may be kept good for more than a month, if stored away wrapped in tissue paper and boxed The sensitizing solution may be used repeatedly, if kept away from strong light, and filtered frequently. We now proceed to

and for those of my readers for whom dread terrors wait when they spread printing ink over the drawing-room table cover, I may explain that it is but necessary to obtain a stout board about sixteen inches wide, and slightly longer than the width of the table; and to screw endpieces below, so that the board fits across the table and clamps it firmly when screw pressure is applied to the ordinary letter-copying press, which is held in place by a narrow wooden rib. In front of the press are two fixed wooden runners, on which the platen carrying the colloid plate slides, and slips easily into the press when inked, etc. Presently a neat French construction will be mentioned, which carries out the same movement.

Bedding the Plate.

A piece of smooth thin paper is cut the exact size of the Sinop plate, which is lying in the so-called etching bath, and this is immersed in water and laid down on the centre of the iron platen, whereon engraved guide marks appear. A sheet of the green gelatined paper supplied is immersed *momentarily* in cold water, and squeegeed down firmly over the paper on the platen: the wide margin of gelatine paper holding the whole firmly on the bed. The etched Sinop plate is now wiped dry on the glass side by means of a cloth, and laid accurately down on the green gelatine paper, over the paper bed beneath. The colloid surface is carefully sponged with a very clean Turkey sponge, and surface dried with a piece of lintless blotting paper. Finally the surface is further dried by means of a fine cloth, with a "dopping" motion.

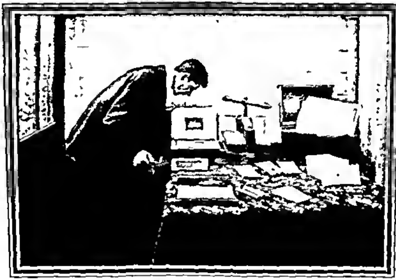
The ink used for printing is the greasy collographic ink, supplied in various colours. This is a hard ink, requiring thorough working up with the gelatine roller, and sometimes improved by thinning with a mere trace of thick palm oil. During the cold days of Spring, this ink is apt to give trouble, and is improved by holding the ink slab before a fire for a few seconds. As the Summer days advance, this difficulty disappears. The harder the ink, within certain limits, the better the results A small bit of the ink is taken on a palette knife and spread evenly across the zinc inking slab, and thoroughly rolled up until slab and roller are uniformly and thinly coated. The charged roller is then passed firmly over the prepared colloid plate, when the image appears exactly as it will be transferred reversed on to the paper The frisket, carrying a firmly attached parchment sheet, is lowered, the thick rubber sheet laid over it, and the whole placed in a letter copying press. A light brief pressure is applied to the screw—released—and the platen withdrawn On raising the frisket, the picture will be found on the back, and this is cut out of the parchment paper by means of a sharp penknife, cutting away also a narrow margin of about an eighth of an inch. It will be found that the pressure has firmly attached the colloid plate to the bed, and

Printing

may now proceed. The power in the hands of the printer is very considerable. A lightly charged ink roller, passed slowly over the plate, will produce a grey print (assuming black ink is in use) full of delicate half-tones; whilst a heavily inked roller passed rapidly across the plate, under pressure, will give a strong print, even up to the well-known "soot and whitewash" effect. After inking, the frisket is laid down, a sheet of paper adjusted to pencil marks on the frisket

sheet, the rubber pad superposed, and the whole slipped into the press for a momentary strong pressure.

After from twenty to seventy "pulls" have been secured (according to the time the plate was etched), the plate will be observed to get dry, which is indicated by dirty whites and a grey veil over the print. A "dry pull" is then taken without inking, and a little of the glycerine etching fluid is poured on to the plate, *in situ*, and spread over every part with the finger. This is allowed to remain for twenty minutes, when it is sponged off, the plate surface dried as before, and another batch of prints obtained. In the case of dirty skies, or where the whites are to be locally accentuated, partial etching is resorted to; whilst when it is desired to obtain "contrasty" prints the plate is re-etched without removing the ink.



PRINTING

REMOVING THE PLATE.

To remove the plate from the bed, run a penknife blade all round the plate, cutting through the green gelatine paper. The plate may then be lifted away, whilst the margin of gelatine may be removed from the platen with hot water. The ink is removed from the Sinop plate by pouring on a few drops of turpentine and gently rubbing with the tip of the finger. It is then rinsed in cold water, washed in running water for half an hour, dried and stored away. I do not know what the limit of printing from one plate may be, but I have taken some hundreds of impressions from one plate, in several operations, without apparently impairing the printing qualities. It is merely necessary to immerse the dry plate in water, etch and print as before.

And now a word about

TWO RECENT IMPROVEMENTS

made in this admirable and fascinating process. On page 34 of last year's PROCESS YEAR BOOK, M. Alexandre Henriot mentioned the coming introduction of a film to replace the somewhat fragile glass Sinop plate. That flexible film is now with us, and one in my hands gives very beautiful prints. There should be a good future for it.

It was mentioned above that the French firm interested were bringing out a new form of press and platen. We regret that we cannot illustrate this instrument, which costs five guineas complete, as it embodies several new and useful features. In principle it is similar to the home-constructed arrangement shown in our illustration, but of course more compact and rigid; in fact it is the same idea carried out by skilled mechanics. But the valuable feature is the addition of movable frisket pins (*cadres à pointures*), which spring down on two sides of the frisket sheet, and by the use of which perfect registration is secured. This means that tri-chromatic printing becomes comparatively easy, and in fact, Sinop collographs superposed in colours have been produced giving wonderfully attractive results.

It remains but to remind the patient reader that by means of the Sinop process results equalling photogravure prints, and in any colour or tone desired, can be produced with apparatus so simple, and on almost any flexible material, such as leather and even wood.

Finally, the Sinop process is peculiarly well adapted for pictorial post-card work. As I write, there lie before me a set of collograph post-cards, produced by an English firm, which are put to shame by post-cards I myself have printed with the apparatus which forms our illustrations There is a quality about the Sinop print which I may vaguely describe as "roundness," which seems to be almost totally absent from the ordinary collotype print

A SINOP ENTHUSIAST

Block by
GLASGOW PHOTO-ENGRAVING CO

Photograph by
JOHN P GLOVER

PROCESS IN AUSTRALIA AND NEW ZEALAND.

By Frank Middows.

READY FOR THE PORTRAIT

Block by The Axe Engraving Co., Ltd — Photograph by J. Trotter

IT is very gratifying to be able to report that during the current year there has been an increased demand for photo-engraving in all branches, and we might safely assert that the volume of trade done constitutes a record for this part of the world. With regard to improvement in quality, this is also pronounced, although there is still plenty of scope in this direction. Process houses generally complain that their customers "will not pay for good work"; this is too sweeping an assertion to be taken seriously, prices are certainly "cut" in some cases, but good work still commands remunerative rates.

With the exception of a few private firms and some of the larger newspaper offices, engravers are somewhat slow to recognise the value of half-tone work on copper, but with much finer screens coming generally into use, it cannot be long before this metal is adopted in place of zinc, so largely used at present.

With regard to the labour market, for some time past there has been a scarcity of half-tone etchers and really first class men would have little difficulty in securing good appointments in these colonies. Though the field is a limited one at present, there are openings for artists familiar with drawing for process reproduction, and particularly those who can work the air brush to advantage in catalogue work, etc

Three-colour work is making steady progress both in quality and quantity, and is now in fair demand for newspaper supplements, calendars, view books, post-cards, etc., the printing of this class of work has vastly improved of late, and the public readily appreciate work of this description; the three-colour blocks made in Australia will compare very favourably with those turned out by the best English houses.

Photo-engravers are fully alive to the advantages of labour-saving machinery in process work, and the plentiful supply of electric power now available in the larger cities of Australia and New Zealand gives them increased facilities.

Easter Morn.

From a Photograph by H Goulton May

WAITING FOR THE COACH

plant to keep down the temperature The writer's experience is that 75 amperes per square foot is about the limit for practical operation This current will deposit shells heavy enough for average work in about one hour Even with this current, extra large tanks must be employed and some means provided for keeping the temperature within reasonable bounds If the foundry is large enough and there is sufficient demand for rush work to warrant it, a special dynamo and tank may be provided for this class of work only As it would not be used continuously and never crowded with work there would be less tendency to heat and some opportunity would be given the solution to cool off Under such conditions half-hour shells are possible When high currents are employed it is, of course, necessary to provide means of keeping the solution in motion It is immaterial what this method may be, provided it is effective Air forced through perforated lead pipes in the bottom of the tank will accomplish the purpose, or a pump or paddle wheel may be utilised It is curious to note that while the time formerly required for depositing has been materially reduced in most foundries, it still requires as much time as ever to prepare the work for the bath The mould must be "cot down" and "built up" by the same old slow process and must have from five to twenty minutes in the black leader and several minutes more for washing out and coating before it is ready for the bath Frequently these various operations consume more time than is required for the deposition of the shell It would seem a profitable field of experiment for inventive electrotypers to devise some means of simplifying these preparatory operations, particularly the black leading and coating. An instantaneous method of metallizing or making the mould conductive which would take the place of black leading and coating is what we want, and the fellow who succeeds in accomplishing this needed improvement may ride in his own automobile.

PORTRAIT STUDY.

Block by
"HELIOS," Rotterdam.

RAPID ELECTROTYPING.

By C. S. PARTRIDGE, CHICAGO.

Author of "Electrotyping" and "Stereotyping."

OUT FOR A WALK

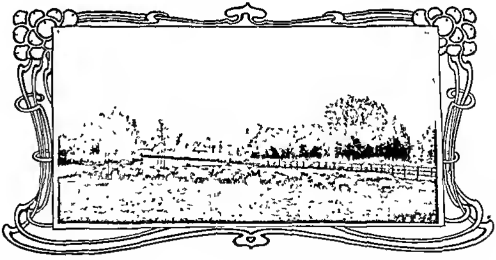
Photograph and Block by W. C. KEENE

IN this strenuous age of the world there is a constant demand all along the line of the manufacturing industries for hurry-up methods, and so keen is competition that in most cases the fellow who gets there *first* gets the business. Time was, and not very long ago, when the printer who should request that his electros be delivered on the same day his formes were sent to the foundry would have been laughed to scorn. To-day, having been educated to the fact that it is possible to make electrotypes quickly, he sends his work in the middle of the afternoon and *demands* his electros the same evening, and the meek and lowly electrotyper, fearing his competitor, hustles the job through to the exasperation of his foreman, the disarrangement of other work in the foundry and consequent cost to the business. Rapid electrotyping is possible, but it isn't economical. So far as the rapid deposition of copper is concerned, it is simply a matter of current. According to the established laws of Electrolysis, 17·94 ampères will deposit one square foot of copper ·001 of an inch thick in one hour. 35·88 ampères will deposit ·003 of an inch, 53·82 will deposit ·003 and so on up to the point where the deposit goes on so fast that it becomes granular and, therefore, useless for electrotyping purposes. It is possible to employ a current of 150 ampères per square foot, perhaps more, which would mean a shell ·008 or ·009 thick in one hour or a shell heavy enough for an emergency job in twenty minutes. As a matter of experiment and to make a test, the writer once deposited a book plate shell in 15 minutes, from which an entire edition was printed, but while such speeds are possible for a single job when all the conditions are right, they are neither practical nor economical for general work and cannot be maintained, chiefly for the reason that owing to the enormous resistance of the solution it becomes rapidly heated to a point sufficient to soften the moulds. In order to maintain the highest speed at which copper may be deposited in reguline form it would be necessary either to build tanks of prodigious size or employ a refrigerating

difference experimentally—by far the best way—focus a well-defined object through the orange filter; observe, with a scale or pair of dividers, the exact size of the image, then, substituting each of the other filters in turn adjust the focus until the image is accurately the *same size*, and notice how many turns, or parts of a turn, of the focussing screw, are required to pass from the one position to the other. Use a good short-focus lens in order to make the aberrations most *apparent*. The correction will, as above remarked, be the same for the same set of filters whatever the lens used, and therefore once determined, can be applied for all lenses as long as the same set of filters are adhered to.

If the surfaces of the glass plates used to form the cell are not *perfectly plane* they will often produce greater effects on the image than the differences discussed above. The safest plan is undoubtedly to use the *same cell for all three filters* then increasing the focus by one-eightieth of the thickness of the filter for the blue, and by half that for the green, is all that will be required both to keep the image accurately the same size, and accurately in focus. As pointed out last year, its thickness should be as small as possible.

Finally, *use the longest-focus lens* practicable; for since the aberrations treated of here, as well as the spherical aberrations, are the same in actual magnitude at corresponding angular distances from the centre of the field for lenses of all focal lengths, it follows that they are less for pictures of a given size, the longer the focus of the lens used to produce them. As a long-focus lens is also of advantage in other respects, in a studio, where such a lens can nearly always be employed, the aberrations here considered become very small if the same trough is used for the three filters. But in the field, where, on the contrary, it is usual to employ a comparatively short-focus lens, they cannot be ignored.



THE SHEEPFOLD

Block by A. BOURNE & Co.

Photograph by THOS FALL

fault, for if the pictures are not exactly the same size, it will be impossible to get them to "register" all over.

There are two ways of avoiding this alteration of size, and as we shall see in a moment, either of them will at the same time assist in keeping the image sharply in focus: (1) cells of *very slightly* different thickness may be used for the three filters, (2) the distance of the lens from the plate may be altered, being made a little greater when obtaining the negative through the blue filter than it is for the orange filter.

The differences in focus are quite minute, only one-eightieth of the thickness of the filter, and are independent of the focal length of the lens. If, for instance, the filter is half an inch thick, the focus must be lengthened by 1-160th of an inch only when the negative through the blue filter is being taken. Or if the filters are to have different thicknesses, the thickness of the red cell must be about one-thirtieth greater than that of the blue.

An inspection of the figure below shows clearly that the introduction of the filter has another effect upon the image; it causes it to be formed at a greater distance from the lens. In other words, it produces a lengthening of the focal length of the lens (this is accompanied, as mentioned above and proved last

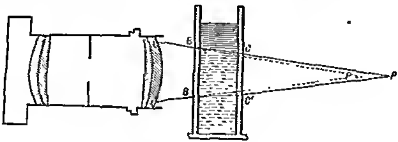


Fig 2

year, by considerable spherical aberrations). The rays A B, A'B' (fig. 2), which should have met at P are displaced and after traversing the filter meet at P'. The distance PP' is about one-third of the thickness of the filter, and it is about one-eightieth of the thickness of the filter greater for blue than for red. The displacement is quite independent of the focal length of the lens, so that if the lens is well achromatized, the extension required to keep the image the same size with the three filters is the same as that required to keep the image in focus.

If three different cells are used, they should be carefully compared with one another. If they differ in thickness by not more than about one part in thirty, *let the thinnest of them be used for the blue and the thickest for the orange filter.* Then the focus once adjusted will probably not have to be altered.*

If the thickness of the three filters differs by more than this, the focus will have to be altered for each colour by a comparatively large amount, namely, about one-third of the difference in thickness of the filters. To determine the

*It need hardly be stated that the position of the image is very different when the filter is inserted from its position without the filter, and that therefore the focussing must be performed with a filter—preferably the orange—in position.

VARIATIONS IN THE SIZE AND POSITIONS OF THE IMAGES IN THREE-COLOUR WORK, CAUSED BY THE COLOUR FILTERS.

By REG. S. CLAY, D.SC.
Principal Northern Polytechnic Institute, Holloway, N.

IN the last PROCESS YEAR BOOK I pointed out that the interposition of a colour filter between the lens and the plate causes a deterioration in the sharpness of the image by the introduction of spherical aberration. If the filter is only for isochromatic work, this is the only effect of the filter that need be considered; but in three-colour photography the use of three different troughs and the unequal refrangibility of the colours photographed may produce effects even more serious unless certain precautions are taken, which I will endeavour to point out.

Suppose A B B′ A′ (fig. 1) to be a filter introduced between the lens O and the plate, and let OA, OA′ be two rays, which before the filter was inserted would have proceeded to D and D′. The filter bends these rays as shown in the figure, the emergent rays B C, B′ C′ (if the filter is a good one with paralleled optically worked glass faces) will remain parallel to A D, and D′, but will be displaced inwards as in the figure. Now, this displacement in itself is not of very great importance, and might be neglected were it the same for the three images, the same, for instance, for the one through the orange as for the one through the blue filter. The amount of the displacement depends upon the refraction of the

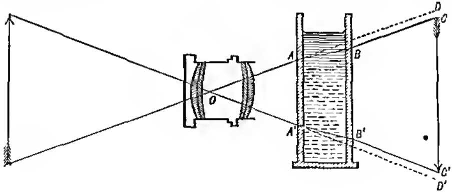


Fig. 1.

rays at A and A′, and this in turn varies with the colour, and upon the thickness of the trough. The blue is more bent than the red, so that if the plate is the same distance from the lens when each of the three colour negatives is taken and the filters are of exactly equal thickness, the negative through the blue filter will be smaller than that taken through the red filter. This is, of course, a serious

coating This, of course, requires a knowledge of the relative strength of alkali and acid, as the carmine prevents the use of an indicator by colour.

The same precautions are to be used as in coating the yellow, which should be done lightly and quickly to prevent softening of and injury to the underlying yellow print. One perfect print of the yellow should be used to transfer the register marks to the mat of the red negative, by the aid of transmitted light.

The printing of the red negative is the most difficult of the three, as the difference of discoloration is less marked than in the blue and yellow. But by a little practice this difference is readily detected, and should form no serious obstacle to the production of good results The development is the same as for the yellow print. The result is a dual print of the yellow and red, and should give all the combinations of various proportions of these two colours.

The key-plate is now to be applied. We depend on the ferricyan decomposition for our colour, which, if taken in the correct proportion approaches the primary blue to a marked degree. Our sensitizer consists of :—

A

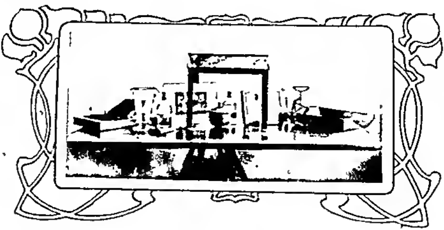
Citrate iron and ammonia	1 ounce
Dist. water	6 ounces.

B

Potassium ferricyanide	1 ounce.
Dist. water	7 ounces.

For use, mix equal parts.

The coating and printing are very simple, the latter to be conducted until the shadows are an ashy gray. The print should then be left in chrome alum water for 45 minutes to insure hardening and permanency When dry, prints may be varnished or glazed, and mounted like ordinary photographs. The simplicity of the process and the beauty of the results should commend it to a trial. The absence of the disagreeable gelatine media, the hot-water developing baths, as well as uncertainty of results, are points which have greatly added to its popularity.



PROCESS PARAPHERNALIA

Photograph and Design by Dr. Henry F. Kock.

This stock solution forms the basis for our first two printings. Our sensitizer consists of:

B.

Potassium bichromate	4 drams.
Ammonium bichromate	48 grains.
Water	10 ounces.

To prepare our yellow sensitizer take:—

Pure Chrome Yellow	200 grains.
A.	3 ounces
B.	3 ounces.

CHRYSANTHEMUMS

Block by PAWSON & BRAILSFORD — Photograph by J. A. YOUNG.

Take the chrome yellow and triturate with a small quantity at a time of A until perfectly smooth. When ready for coating add B. In applying the sensitizer to the sized paper, it is advisable to use a wide bristle-brush and apply at right angles to the arrows and then smooth down with a good badger in the arrow direction, then hang up to dry as before

The paper may now be cut to size allowing a margin of one-half inch all around The negative is placed in a mat one inch larger all around, to allow for register marks, similar to those used in lithographic printing. These are made by drawing lines on the mat at right angles to each other, so as to have a single line at each of the four sides of the negatives. The paper is then placed behind the negatives, and by means of a lead pencil the register marks transferred to the print. The exposure, depending on the light, is a little less than ordinary gum printing, about 2 to 3 minutes in the sun.

The development is by pure water, soaking therein for thirty minutes, but using no brush, atomizer, spray or other mechanical device, to bring out the detail. The print is then hung up to dry.

The red sensitive solution is now to be applied.

Carmine	1 dram.
A.	3 ounces.
B.	3 ounces.

The carmine is first dissolved by the aid of a little ammonia water, which is later neutralized by means of acetic acid, after the sensitizer is prepared for

COLOUR PHOTOGRAPHY.

HENRY E. KOCK, M.A., M.D., LL.B., M.R.P.S., CINCINNATI, O.

" Shadows dark and sunlight sheen
Alternate come and go "

...k by ...the Cox Illustrating ..., Ltd. Photograph by J. C. Pritchard

IN response to your kind request I send you herewith a short treatise on a very simple method of Colour Photography. The method is especially applicable to the testing of negatives for trichromatic printing obviating the manufacture of printing blocks for this purpose. From this it will be observed that the method is based on the three-colour additive theory.

In brief the process is the conjunction of the three negatives in their appropriate colours. This is accomplished by the modified gum process and iron reduction method with the suspension of the correct colours in the media. Instead of printing each colour on separate sheets and then joining, the process is simplified by printing each successive colour on the previous one, similar to the typographic method and allowing the colours to follow in the same succession.

As the method comprises but the printing from the negatives, the preparation of the filters and the exposure and development of the negatives need no discussion here. It is the preparation of the paper that concerns us chiefly.

The only serious difficulty that we must aim to obviate is the distortion of the print or paper while sizing, coating and drying. To do this it is customary to let all brush-strokes, etc., tend in one direction, which is easily attained by noting this direction on the back of the print by means of arrows.

The paper stock should be Whatman's hot-pressed or a good ledger paper. The sizing should be gelatine or chromatized glue. In hanging up to dry, the arrows on the back of the paper should point down.

When the large sheets have been sized and dried, they are ready for coating with the sensitive layers. We first make up our stock of gum solution :—

A.

Gum acacia	2 ounces.
Arrowroot	1 dram.
Aqua dist........................	6 ounces.

The Remorse of Judas.

Photographed direct from the Painting in Tate Gallery by The Marshall Engraving Co

Painted by E. Armitage

softer for the half-tones and lighter tints. Some very beautiful results produced in this way, but the plates as a rule would not stand printing in numbers.

A few years later Joseph Albert, of Munich, introduced the princi using glass plates to support the gelatinous films and hardening the latter exposure under the negative by exposing the under surface to light fro back through the glass. This was a great advance. Further improve were made by Gemosen and others, who added resinous tinctures to the tinous mixture; while Ernest Edwards, in England, got over many of the di ties which beset the process by stripping the films from their original sup exposing them from the back, as in Albert's method, and then attaching firmly to metal plates to be printed in the ordinary Albion press.

I took up the question myself in 1870, after having seen Tessie du Mot work at Metz in 1868, in order to meet demands for half-tone reproductio photographs for various purposes, and also to obtain finer reproductions o work than the ordinary photo-zinco transfers would give. At that time little was known of the practice or theory of collotype-chromate printing were proper materials available, and so one was thrown very much on own resources I had already had some experience with half-tone photo- transfers, but wanted something better.

In 1866 I had found that photo transfer prints on gelatinized paper, harc with tannin, when damped took printing ink very readily on the lines and rendered insoluble by light. My earliest collotype prints were pulled from prepared with gelatine and tannin, sensitized with bichromate of potash, after exposure cemented down to a zinc plate. Sharp, clean prints coul produced in this way, but the paper was liable to split, under the action o roller. The dark brown colour of the printing surface was also objection and so this method was abandoned. Some time afterwards I found that by use of an organic acid in the coating, such as citric or tartaric acid, the gelati coating would have soaked into the paper and prevented this splitting.

I then took to glass plates as the support for the films, and many ex ments were made with varying success with chrome alum, bichloride of merc resins, and other hardening agents, but on the whole I preferred tannin, espec for line work, because it gave clean, crisp lines free from the double edg noticeable in many of the other methods then worked.

It was found most convenient to coat the plates with an emulsion of gela sugar, soap and tannin, dry them face downwards in the open air, and sensitize them when wanted in a 5 per cent. solution of bichromate of po and dry them in a drying-box

The difficulty of obtaining perfect contact between the negative and printing plate, especially when stripped film negatives were used, was obvi by transferring the film to the sensitive gelatine surface and removing it a after exposure The dry gelatine surface of the printing plate was first o covered with a thin coating of wax, dissolved in turpentine or benzole plate was then put into a dish with sufficient spirit of wine to cover it thin negative film was laid down upon the gelatine in its proper position, plate and film removed together from the spirit and the film carefully sque into contact with the gelatine surface The plate was then covered with a sheets of blotting paper under a thick glass plate and allowed to dry A exposure the negative film was carefully drawn off the gelatine surface of the pl and if sufficient wax had been used and the film was tough, it would come a easily without tearing. If it did tear it had to be at once dissolved off v

ether, to prevent a continuating action of light on the parts covered by the remains of the torn film. The wax was removed with turpentine. The object of transferring the films in a bath of spirit of wine was that it had no effect upon the gelatine, wax, bichromate or negative films. The spirit could be used over and over again. This method was of great use when working with metal plates, which were seldom truly flat all over. It might possibly still be useful with celluloid film negatives.

For judging correct exposures an actinometer was indispensable, and it was found most convenient to use one in which strips of glass coated with the same sensitive mixture as the printing plate formed the sensitive surface, the scale being prepared by reproducing a series of the graduated tints, as a negative, intensifying it to suit the character of the negatives in use. By thus using similar sensitive surfaces in the actinometer and in the printing frame with negatives of corresponding density, a very perfect register of the printing action could be obtained. The action of light usually extended a few numbers beyond those visible, so when a plate appeared to have received sufficient exposure, but might take a little more, the glass slip was taken out and put in water; when the full extent of the action of light and previously invisible numbers could be seen.

After exposure, the plates were exposed at the back under a ground glass to harden the whole surface and prevent irregular and excessive swelling during the soaking and printing. A little tallow was rubbed round the edges and the plates were thoroughly soaked in cold water to remove the bichromate. These tannin plates required a long soaking to get them into a fit state for printing, but they were very firm and tough, even in hot weather.

Saas Fee

Block by W. F. Sedgwick Ltd. — Photograph by H. H. Connah

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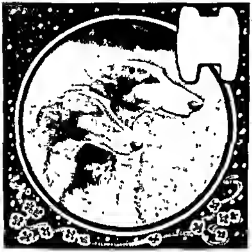
EXPERIENCES WITH PHOTO-COLLOTYPE IN INDIA.

By Major-General J. Waterhouse, I.A.



Mates

Block by Pawson & Brailsford — Photograph by Thos Fall

HALF-TONE by photography having become almost more common and even more simple than line work, few of those working the modern methods know of the early efforts that were made to overcome the difficulties that beset the reproduction of half-tone in the printing press by various processes of photo-lithography and photo-engraving, the main difficulty being the production of a grain which should suitably break up the image, but still preserve the proper gradation of the half-tones without roughness or rottenness. This is perhaps most difficult of achievement by the ordinary methods of photo-lithography, even on grained stones. Paul Pretsch seems to have been the first to publish the fact that a film of bichromated gelatine exposed to light under a negative and moistened would only take up printing ink in the exposed parts, but he made no practical application of it to photographic printing, except, perhaps, by transfer His French contemporary, Poitevin, on the other hand, started by coating a lithographic stone thinly with bichromated albumen, impressing the photographic image from a reversed negative, moistening it and inking up the image like a lithograph. Working thus with albumen for his sensitive coating he appears not to have completely recognised the full value of the chromo colloid film as a printing surface, and always worked on stone, adhering closely to the ordinary methods of lithography. In the hands of experienced lithographic printers Poitevin's method was used in France for many years, but never came into general use for half-tone work, the transfer methods being found more convenient.

Although proposed by Pretsch in 1854, what may be called the "Collotype" principle of using a sensitive film of a substance such as gelatine, insoluble in cold water, but absorbent if in conjunction with an alkaline bichromate on a glass or metal plate, moistening it after exposure and inking it up, was first turned to account by Tessie du Mothay and Marechal, of Metz, in 1866. They created copper plates with a mixture of gelatine, trichromate of ammonia, a salt of mercury and other hardening agents; exposed them to light under a reversed negative—further hardened the films by heat and soaked them in water. The images were then inked up with two inks, a stiff one for the shadows and a

softer for the half-tones and lighter tints. Some very beautiful results were produced in this way, but the plates as a rule would not stand printing in large numbers

A few years later Joseph Albert, of Munich, introduced the principle of using glass plates to support the gelatinous films and hardening the latter after exposure under the negative by exposing the under surface to light from the back through the glass. This was a great advance. Further improvements were made by Gemoscn and others, who added resinous tinctures to the gelatinous mixture; while Ernest Edwards, in England, got over many of the difficulties which beset the process by stripping the films from their original supports, exposing them from the back, as in Albert's method, and then attaching them firmly to metal plates to be printed in the ordinary Albion press.

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It was found most convenient to coat the plates with an emulsion of gelatine, sugar, soap and tannin, dry them face downwards in the open air, and then sensitize them when wanted in a 5 per cent solution of bichromate of potash and dry them in a drying-box.

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Saas Fee

Block by W. F. Sedgwick, Ltd. Photograph by H. H. Cossan

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of gelatine upon glass in a hot moist climate, as well as the tendency there was during occasional periods of very dry weather for the gelatine coating to fly off and destroy the surface of the glasses; further, there was no risk of breakage. Being coated with a very small quantity of gelatine solution they dried quickly and evenly, the printing surface retained its sensitiveness for several days, adhered well to the support and was fairly resistant to the wear and tear of printing.

Copper plates similar to those used for engraving, were finely grained with sand on the smoothed side, bevelled, washed with filtered hot water, and coated on the grained side, while wet, with a mixture of

Gelatine	15 parts.
Water	100 ,,
Potassium bichromate (in powder)	4 ,,
Formic acid (when the others are dissolved)	·4 ,,

The excess was poured off, leaving sufficient to give a thin even coating. Half an ounce of gelatine was more than sufficient to cover 450 square inches of surface. The plates were dried in a drying box with the usual precautions as to dust and level, and dried in the course of an hour or two. They were kept a few days to harden, but if required for immediate use a little tartaric acid (about 1·3 part) was added to the above formula with advantage in hardening the films and making them less granular. Tartaric acid alone used with gelatine and bichromate also gave very good printing surfaces, and in some experiments made in 1875 with films and tough paper coated with a mixture of gelatine, bichromate of potash and citric acid it was found that the acid besides exerting a hardening action on the film, caused the gelatine solution to permeate the paper, and thus prevented it from splitting under the action of the roller, as it did in my first photo-collotype trials.

Those interested may find fuller details of most of this early work in the *Photographic News* from 1871 onwards.

SLY

Block by
"HELIOS, Rotterdam

Night.

A New Two Colour Process by
The Dean Engraving Co

Photograph by
H Goulton May

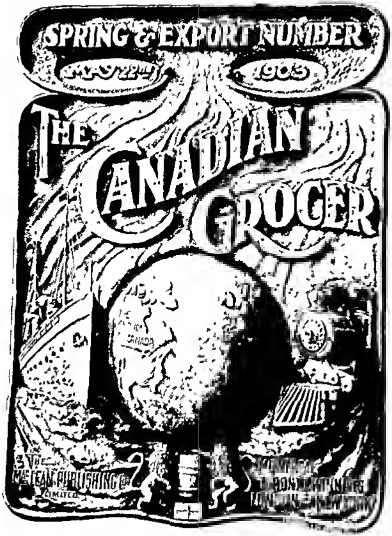
A Modelled Half-Tone.

Block by
The Exemplar Engraving Co

Designed and Modelled by
George Stuart Littlejohn

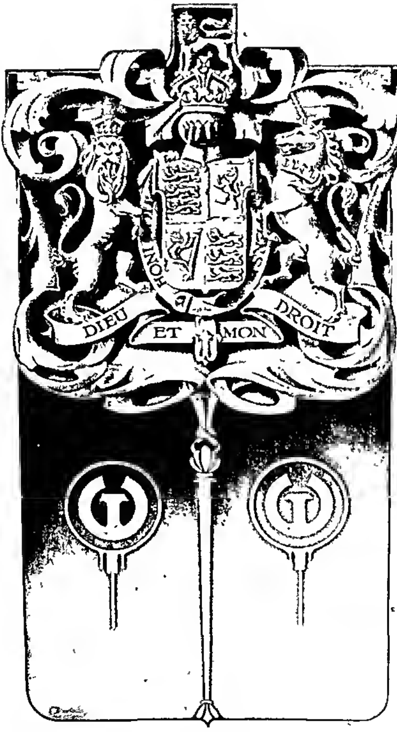
Clay Modelled Design.

Design and Block by
C. P. Zacher & Co



By C P Zacher & Co Chicago

Striking Advertising Designs.



A Cover Design.

Design by
Warner & Winship

At the Foot of the American Falls, Niagara.

Block and Tint by
The Art Reproduction Co. Ltd

Photograph by
F. T. Corkett

THE HALF-TONE PROCESS BY A PROFESSIONAL PHOTOGRAPHER.

By F. M. SUTCLIFFE.

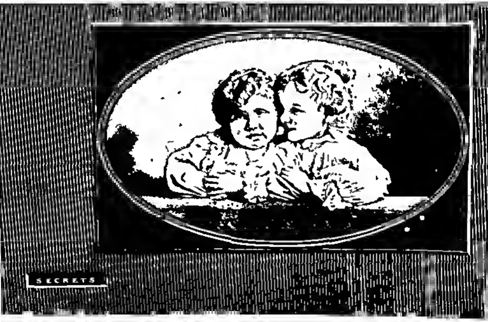
PORTRAIT STUDY

Block by ART REPRODUCTION CO. LTD. Photograph by J. TROTTER

IT would seem as if the half-tone block maker and the photographer had entirely different standards by which they judged the prints from process blocks; if this were not the case, PENROSE'S PICTORIAL ANNUAL would not contain so many downright bad prints, sent in, by the way, as examples of what different block makers *can* do.

Take the first illustration in the text, for example, on page xv. of the Annual for 1903. However good the original photograph may have been, the print is quite false in the rendering of the various tones. There is not sufficient difference between the tones of the wall and those of the floor and the window. If the photograph the *block* was made from was properly exposed, properly developed and printed, the window would be much lighter than the floor, and the floor would in all probability be lighter than the wall. Apparently the block maker has falsified all the tones in his *foolish* endeavour to get a brilliant print, forgetting that the effect of brilliancy is *not* got by heightening the scale of all lights, but by keeping these in their proper relation to the shadows. Turning over the page to xvi one sees block making in its right place; here the block maker cannot well upset all the artist's calculations. Next we have a screen photogravure with much wanting in the high-lights. Then a coloured post-card (Mr. Ruskin told me he hoped he would never live to see photography in colours—a thing like this utterly false in every way would have surely killed him, it makes less sensitive people feel ill). Then we have a block by a firm which understands its business. Let the reader study the "Study" by Misses McCaul and Dickson, and they will see that the half-tones of the flesh have not been quite "burnt out," the face of the figure suggests a living being of flesh and blood. Compare this with the over-intensified block further on of a flower girl, and the reader will see how much beauty is lost in the attempt to "clean up" the high-lights. Anyone who has seen the great screen in Winchester would hardly recognise the view of it between pages 16 and 17, simply because the block maker has made the secondary and tertiary lights equal to the primary ones. The block of H.M. the King is bad for the same reason, in fact nearly every illustration in the book fails because the block maker has not read all that Mr. Ruskin and others have written about black and white.

The blocks 152 and opposite are both bad. The one on page 144 is especially good. The one on 108 is good, and the one on 120 bad. The one of "Joan of Arc," between 96 and 105, is very good. There is also an excellent print of a butterfly on page 83. Nine block makers out of ten would have made this more "brilliant," and have made a *white* butterfly instead of a brimstone one. One of the worst blocks in the book is the one on page 78. Here the sky and sea are so much too white that the boats and quay appear quite black, instead of brown and grey, by contrast. The reason for this is that the print sent to the block maker was on brilliant gelatine paper, which gave too great contrasts for such a strong negative The block makers should have said we cannot make a good block from such a hard print, and have asked for one in albumen or carbon with more truthful tones I cannot help thinking that if every block maker would read the article on screen distance by Mr. A. J. Newton, on page 41 of last year's Annual, he would be able to overcome the blocking up of the high-lights, wherein, by the way, the principal charm of most photographs lies, in his blocks If his art education has not been such as enables him to know when he has got a truthful rendering of the photographs he is reproducing, then he should call in some expert; there are many painters now whose living has been taken away by cheap picture makers, who could and would tell him where his blocks were wrong and offensive to cultivated eyes The block maker takes his cue from a page of black and white letterpress where the contrasts are great. The photographer sees a world full of half-tone, with only very small bits of black, and very small bits of white in it The former sees a piebald horse, the latter a grey one.



SECRETS

Block by
W. & G. Baird Ltd

Photograph by
Lafayette

THE ADVANTAGES OF COLLOTYPE FOR THREE-COLOUR REPRODUCTIONS.

By C. Real.

The Attack

Design and Block by Lascelles & Co Ltd

Photograph by Martin J Ridley

COLOUR photo-mechanical reproductions show a remarkable progress, and their use has become more universal; the more it is to be wondered at that the method of reproduction should be confined to only one branch of process work.

It is the endeavour of all engaged in colour work to minimise the effect of the screen, and to produce a picture free from the disturbing influence of grain.

Half-tone colour reproductions (generally executed in 150 or 200 screen) show, if not a troublesome pattern, a very decided grain caused by the dots of the half-tone blocks, and to overcome this difficulty it has been suggested that a screen as fine as 400 lines per inch should be used. If this suggestion were carried out—and there is every prospect that it can and will be done—the beauty of the picture would be greatly enhanced and, except by close inspection, the granular appearance be absent, yet the fault would not be wholly obliterated. It follows then, that the ideal process for colour work is one free from these defects; in which if there is any grain at all this is so fine as to be imperceptible, or at any rate of such a texture as to be pleasing to the eye.

We have heard of attempts with carbon tissue, layers of differently coloured gelatine being employed, or of Lumière's and Sanger-Shepherd's methods, where thin sheets of celluloid carry the separate colours; the latter are highly successful from an experimental standpoint, the former a failure But when dealing with colour work in quantities, this can only be produced by paper and ink, and if free from the obstacles that beset the way of the block maker so much the better.

Collotype, once the favourite and now the much neglected branch of photo-mechanical printing, is eminently adapted for this purpose Collotype plates must possess some grain to be printable, but this necessary grain can be so fine and of natural formation that it is nearly impossible to detect it even under close scrutiny

But while I assert that colour work by means of collotype is superior to half-tone process, do not let it be supposed that I shut my eyes to the many

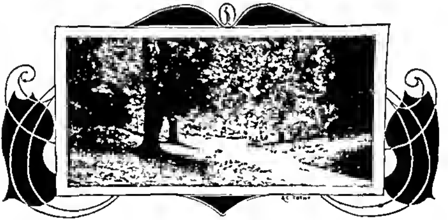
difficulties that have to be overcome by this method, nor to the splendid and remarkably cheap results that have been the outcome of incessant, costly experiments and real hard labour of process firms. Colour blocks can be greatly improved by the fine etcher; shortcomings of the negative are remedied by him, progressive proofs are taken, alterations made until the parts form a harmonious whole.

Collotype must be right from the beginning, the negatives perfect, the plates faultless, alterations are out of the question. Not only must the photographer be a colour expert, but the printer ought to be a well-trained man, by preference one who has served some time as lithographic printer.

There are a number of firms who have the necessary facilities, and whom it would pay both in credit and money to give this branch of colour work their close attention.

Care, perseverance and knowledge are required, the difficulties are such that need not frighten the aspiring worker, he will be compensated by a product soft and rich, pleasing to the artistic sense, and as yet unsurpassed by any other process.

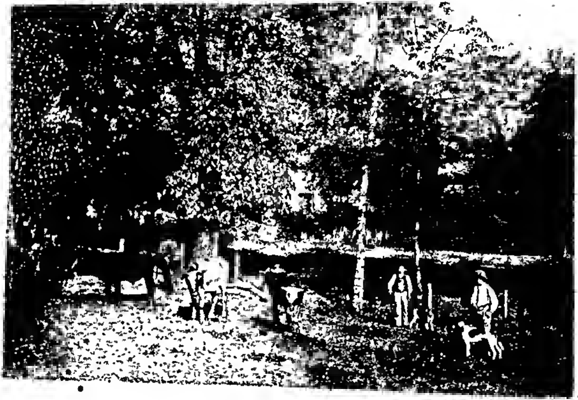
The greatest objection that could be brought against collotype is that it is slower and a little more expensive than block work, and this might be a disqualifying factor in competition for commercial work, but having the advantage in quality it recommends itself for art and facsimile reproductions.



A Woodland Roadway

Design and Block by
Lascelles & Co., Ltd.

Photograph by
H. C. Leat.



A French Pastoral.

Specimen of
Sinop Collography

SOME NEW FEATURES OF THE SINOP PROCESS.

By ALEXANDRE HENRIOT.

(TRANSLATED BY THE EDITOR)

MINS SPOTS A MOUSE

Block by HAIPFLOW & Co — Photograph by THOS FALL

WE have already described this process to our readers in our volume of 1903. We recall that it consists of a system of obtaining impressions in greasy inks from photographic negatives, thus permitting us to obtain with very simple materials and by manipulations with the fewest complications, proofs which rival those obtained in the best art printing establishments.

It is needless to speak again of the process by which the prints are made, when it is now so well known everywhere. It is the interesting improvements that invite our attention. First of all we will speak of the Special Frame with Registering Gauges. This little apparatus is adapted to the Sinop bed plate with the object of ensuring the absolute registration of impressions superposed in polychrome printing. It is extremely easy to manage and its precision is perfect. This novel accessory completes the Sinop equipment by furnishing the amateur with a simple means of obtaining the tri-chromatic proofs. Directions for use are furnished with the frame, and it is not necessary to enter into more details of the same

Another improvement, in connection with the Sinop plate itself, is one facilitating the determination of the exposure and producing great regularity in the inking These two very important points demand further explanation.

The exposure of the Sinop plate under the negative, as practised up to now, presented a difficulty The image, hardly visible on the back of the plate, led to uncertainty on the part of the beginner, and only after some time has the difficulty been overcome by practice.

Is it enough, or too much, or too little ? This was the question when making exposures And since the result is not visible until the first proof is printed, the fear of spoiling a plate is always present.

The new method, on the contrary, consists in letting the image come until it is completely visible and gives the effect of a complete positive.

This point is very easy to attain if one takes care to examine the negative a little, and this operation is not really more difficult than when the print is a positive on silver paper.

The errors of exposure are found to be reduced to a minimum, the inking is made easier to a much greater degree than before, and this facility is again increased by the special texture, which is imparted to the film after the drying with heat which it undergoes and which we proceed to describe.

The two important improvements in exposure and inking are obtained, in effect, by means of a little very simple supplementary manipulation, consisting of taking the plate, after draining for two minutes, from a kind of sensitizing bath of bichromate and placing it horizontally in a box stove, which has been formed by a slight transformation of the box containing the outfit. A little spirit lamp, which is regulated once for all, ensures the degree of heat necessary and the duration of the heating without which it would need watching.

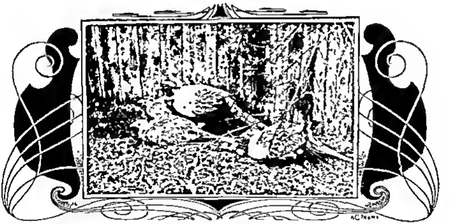
This drying with heat practically replaces the cold desiccation previously practised and takes about 20 to 25 minutes.

This new arrangement, invented quite recently by the Sinop Company, will shortly be placed on the market, but in the meantime, the company or its agents will send on demand the instructions necessary for amateurs desiring to make the trial themselves of this very simple change, and will furnish the adjuncts indispensable for carrying out the same.

The registering frame added to the new method of employing the Sinop plate makes the process more perfect and, indeed, the most practical of its kind.

The amateur is relieved of the difficulties inherent to the employment of greasy inks, and the rapidity of the prints, their regularity, and the indifference as to the choice of paper are rare qualities which tend to make the Sinop apparatus valuable and popular

We may add that the excellence of the Sinop process has been recognised recently by the award of a silver medal at an exhibition at Castel Allemand.



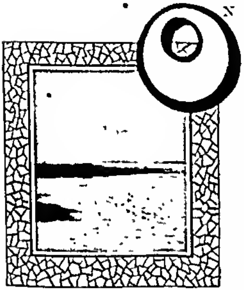
PHEASANTS

Design and Block by LASCELLES & Co., LTD

Photograph by THOS FALL

"BITTEN" v. "GROWN" PLATES FOR PHOTOGRAVURE.

By Alfred Dawson.



Where wave worn foreland ends the bay

Block by London Etching Co. Photograph by J. C. Pinthman

In proceeding to set down a few thoughts regarding the merits of the two classes of plate, viz., Grown plates as against Bitten plates, I naturally run through the discussions and toils of many years, when the balance has gone one way or the other, and now, in the present day, just thirty years after issuing the very prettiest grown plates, it is asked that some of the old features be once more brought into view

This being admittedly so, it is evident that the points where the grown plate excels are points of pronounced value, so much so that their loss by reason of the prevalent bitten plate, so much more quickly produced, is still felt and is noticed every time one or another expert turns over old drawers of prints or publications or file books.

The first feature of note in the grown plate is that it is produced from a negative and not from a positive, so that all matters dependent on detail are one operation nearer to the original, and so much sharper in outline. The effect of this is very noticeable in line work, for, of course, all line work whatever is dependent on rendering not only the line but the character and detail of the line, however subtle and light those characters may be. An etched line, if weak and shifty, a pen line which has a slipping, catchy look as the ink stayed thicker or thinner over the roughnesses of the paper, must be produced just so, or it is disagreeable in a reproduction The bitten plates do not fail much here, in accomplished hands, but the general rule is that they do fail, and that in the grown plate these delicacies are more easily and naturally produced. Referring to this branch of the subject I may note the effect of a white paper surface on each sort of plate. I like to see an old drawing on old paper so produced that the surface looks real to the eye, but it is extremely difficult to give the look and surface of old paper in a reproduction on the bitten plate. It is dependent on such niceties of shade in the detail that even the most accomplished plate maker cannot quite catch it Then there is a still harder thing, the grain in ivory, which comes in

with miniature reproduction. I cannot say that I ever saw it caught in a plate as well as it is wished for, but the grown plate comes distinctly the best out of this crucial test.

Closely connected witb this follows the capacity for giving a really fine line How fine the intaglio line can be got by this method I leave the reader to guess. when it is found possible to make a copper plate from the full-sized ordnance map some 36 inches long, to come clearly legible at about 1-10 scale linear or 3½ long, mountains included, so that the printing of the plate is the chief difficulty remaining. More tban one scheme for a tiny ordnance map of England for the pocket has failed on account of this printing difficulty.

Having said so much for the inherent beauties of the grown plate, when executed by a proper method of making the mould, it is only fair to note with care the shortcomings of grown plates.

The one which chiefly occurs is the difficulty of differentiating tbe darker tints. It is often observable that a darkish sort of grey is nearly the natural limit, because the mode of forming a grain is itself not so able to give depth as the atomised bitumen laid on the metal and bitten into with a mordant

In writing this part it must be carefully noted that no account is to be taken of rebiting Of course, all plates worth any notice at all are capable of rebiting, and few are the plates that cannot be improved by a careful rebite. Moreover, some of the attractive little plates produced in France are very largely rebitten, the reason being, doubtless, tbat they wear well wben so produced.

Yet it must be allowed that, quite apart from this, the bitten plates give a most excellent gradation of dark tones going, if not to a black, yet so near to it as indeed to assist the finisher, who then knows just exactly where and how to put the final touch.

There is, however, one beauty in tbe grown plate not seen in any bitten plate, viz., the kind of low relief or modelling, which is technically termed "mould," and which greatly assists tbe rebiting and also the printing, it being the part of the printer, by his skill, to bring out a plate and, strange as it may seem to an observer, it is, nevertheless, true that a plate can be most perfectly wiped off as it lies on the printer's "jigger" without so much as holding or steadying it with the left hand, and to see it slowly turn round and round while the canvas is being swiftly and deftly passed over it is quite a surprise—but this yields the best prints—and this suits a plate the surface of whicb, as in many grown plates, is in a gentle "bas relief."

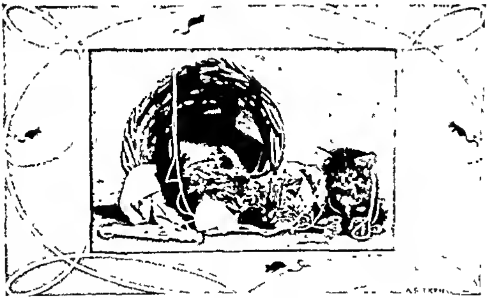
Many a time a quantity of dark detail is brought out by a skilful printer using the hand or canvas lightly and with speed, so leaving ink in the most delicate depressions.

The rebiting of the darks in grown plates is far from easy on account of the frequency of undesired undulations, caused by irregularities in the depositing. Theoretically, they should be level and nice, but very often through obscure causes the mould sweats while the copper is growing on it, and the leakage of gelatine through the copper causes gutters to come in the back which are reproduced through the copper on the front. Experience and good workmanship overcome this in a surprising manner, but still the problem remains and hinders that freedom of production needed for general business.

One of the advantages of grown plates is the purity of the deposited copper which holds the steel face most tenaciously and wears accordingly. One method of making the grain I will note which, with skill, gives very nice results The tissue is rolled over with a fatty oil, and then by means of a flannel roller very skilfully used a bronze powder can be laid upon it in a very regular fashion.

It is then carefully laid on the negative and printed, and before development this is carefully cleaned off. On developing, a matrix or mould is produced with a fine perforation all over it, and this perforation is made more emphatic by soaking the mould in dilute spirit of wine for a time. When dry it may be prepared for the battery, and the plate grown from this is always nice and flat, but lacks the quality of a moulded surface referred to. It is very satisfactory for reproducing old prints, and if well managed the illusion is quite magical. With yet more skill in preparation of negatives it will yield pretty reproductions from water-colour sketches, but it is fair to remark that with full-toned subjects, such as mezzotints and oil paintings, I have not been able to please myself on this plan.

Meantime note that a number of modes of making and preparing the mould exist, though all are of gelatine, yet the whole subject is a field beyond the scope of the present article.



AFTER THE FROLIC

Design and Block by
LASCELLES & CO. LTD

Photograph by
MARTIN J. RIDLEY

THE "INK-PHOTO" PROCESS.

THE GATEWAY
CARISBROOKE CASTLE

Block by
THE MANCHESTER WOOD ENGRAVING CO., LTD.

Photograph by
GEO. L. BROWN

IN previous years we have referred to the "Ink-Photo" Process, a method of reproduction which continues to enjoy increasing popularity among all classes of lithographers, and we, therefore, think that a few lines on the subject may not be without interest to our readers.

The lithographic industry has been most hard hit by the advent of the half-tone block, and even the most conservative of its workers have not been slow to welcome a process which enables them to compete with the letterpress method with no outlay as to plant, etc.

The "Ink-Photo" Process is a half-tone lithographic method of reproduction, the gradations of tone being translated by means of an irregular yet perfectly smooth grain which lends itself admirably to any class of work, giving an artistic and non-mechanical effect, while faithfully keeping all the gradations of light and shade.

Being a lithographic process, the "Ink-Photo" reproductions are produced as transfers, which can be laid down on his own stones by any lithographer, who can, in many cases, obtain results equalling that of highly expensive methods, chromo work, collotype, etc., at a fraction of the cost. In addition, any number of extra transfers can be supplied at a nominal price, thereby enabling the lithographer to work off his job from original stones.

This process is now the recognised method of reproducing engravings, pencil and crayon sketches, as the productions are absolutely fac-similes of their originals, there being no screen effect as in half-tone reproductions of these subjects, while the cost by the "Ink-Photo" Process is lower than that of any other method.

Wash-drawings, photographs of all kinds, chalk drawings, old manuscripts, etc., can be reproduced admirably by its means, while many of the highest class of architectural designs have been reproduced by this method. Chalk drawings in one colour, pulls from colour stones, can be reduced or enlarged as desired, and the picture obtained in a new size at a cost far lower than that of re-drawing.

For tin-plate work reversed transfers can be supplied from any original. Thus, if any certain view or portrait is to be printed on a label, wrapper, poster or tin-plate, from any original, be it photograph, wash or chalk drawing, engraving, etc., an "Ink-Photo" transfer can be supplied at a fraction of the cost of drawing on stone.

For views of estates, pictorial post-cards, views for exhibiting in railway carriages, fashion subjects, etc., this process is an invaluable method of repro-

duction. Elaborately engraved copper plates can also be reduced or enlarged as desired; thus, one plate having been engraved, the design can be utilized in several sizes, on different kinds of stationery. For a cheap heading for, say, an insurance policy, an "Ink-Photo" transfer can be supplied from a wash-drawing of the design at a fraction of the cost of engraving same.

In many cases the actual article to be lithographed (let us take for example a case of pipes) can be photographed direct, the "Ink-Photo" transfer giving an actual photographic picture embodying a degree of exactness as to detail etc., which the litho artist could never obtain.

This leads us to consider a new method of colour reproduction which is fast gaining ground. From the sketch or actual article to be reproduced several "Ink-Photo" transfers can be supplied 6, 7 or 8, according to the number of colours required. The transfers having been laid down, the lithographer has before him his stones, each bearing a photographic key to his picture, giving a faithful reproduction of all proportions, etc. By dint of working on each of these stones, scraping parts away and touching other portions in solid, the colour stones can be made up very much more cheaply than by the old method of drawing the whole, while a skilful lithographer, profiting by the gradation of light and shade, obtained by this process, can usually effect an economy of three or four printings. Another advantage is that a coloured photographic, and therefore faithful, reproduction of the original is obtained in place of the litho artist's rendering. This method is extremely simple in practice, and is at this moment being used by many well-known firms. Any lithographers desiring further particulars of the "Ink-Photo" Process, specimens or prices, should apply to Messrs. R. J. Everett & Sons, 19, Bartlett's Buildings, Holborn Circus, E.C.

Every lithographer has from time to time a call for photo-litho transfers, of line subjects, plans, maps, tracings, pen and ink drawings, etc., but may sometimes find himself at a loss to know where to obtain the best results at a reasonable price. We are pleased to be able to inform any of our readers who *may be similarly placed that Messrs. Everett also make a speciality* of these photo-litho transfers of line subjects, and supply lithographers with good, strong transfers at reasonable prices.

THE FISHING FLEET

Block by
THE MANCHESTER WOOD ENGRAVING CO. LTD.

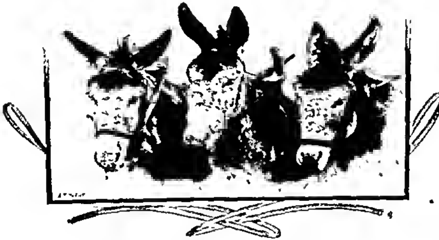
Photograph by
JEFFREY BROWNING.

HIGH-POWER TELEPHOTOGRAPHY.

By ARTHUR E. SMITH.

A TELEPHOTOGRAPH of any object is a photograph taken through a sort of telescope, really a tube with an ordinary positive photographic lens at the front, and preferably a negative lens at the back end. By this means an image of almost any size can be obtained by lengthening the camera extension and slightly closing up the lenses together until the image is seen sharp on the ground glass. These combinations of lenses are generally used to get a slight magnification, but in the illustration, the top part of St. Paul's, the magnification is very great—24 times; the small photograph at side was taken with the positive lens alone, and is far too small to be of any use, but by adding the negative lens and extending the camera the large photograph was obtained. This large photograph shows far more detail than could be seen with the unaided eye The stop of the positive lens was $f/22$, but as the photograph was magnified 24 times we have $22 \times 24 = f/528$. This is far smaller than the nominal limit, but works well nevertheless. The exposure for the small photographs was about $\frac{1}{4}$ second on the process plate, and for the large one about two minutes on a very rapid plate. There are no snap-shots in high-power work, and, owing to the extreme smallness of the stop, there is considerable difficulty in focussing

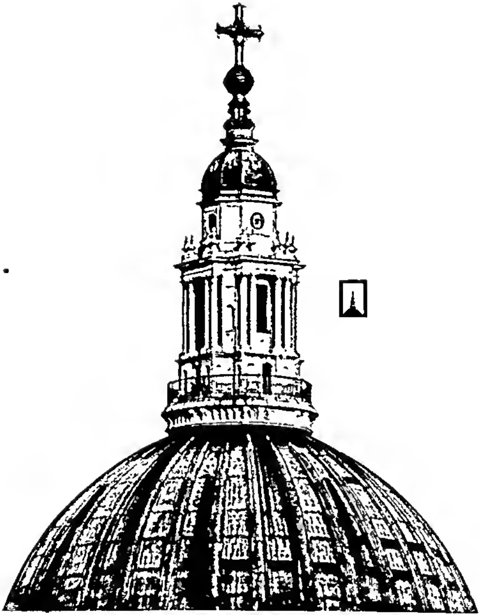
St. Paul's was distant from the camera about 1000 feet through London atmosphere. There are very few days in the year clear enough to admit of a telephotograph like this one being taken.



WE THREE

Design and Block by LASCELLES & CO., LTD

Photograph by MARTIN J. RIDLEY



The Dome of St. Paul's.

Note —The small view shows actual size taken with an ordinary lens

Block by
Art Reproduction Co Ltd

Telephotograph by
Arthur E Smith
(See article)

Blanche Thorp.

Block by
Ph. Lipson Son & [illegible]

Photograph by
Reinhold Thiele

Happy Childhood.

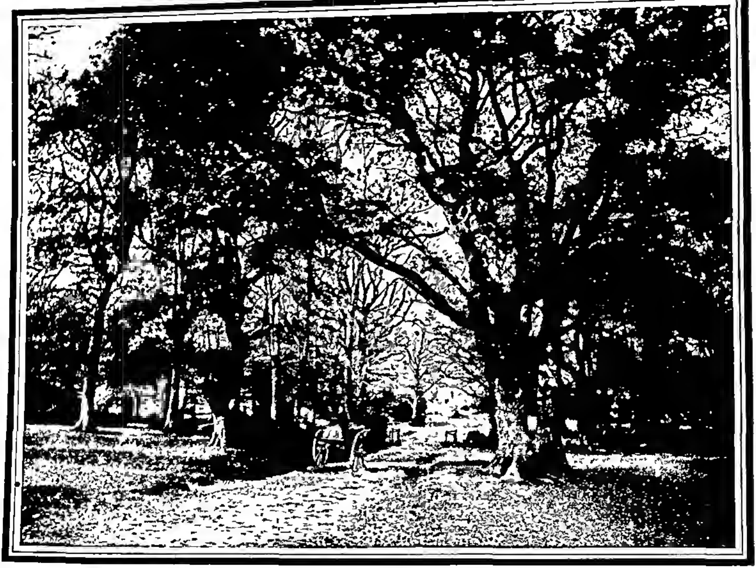
Block by
"Natal Mercury"

Photograph by
Mr F A. Sams, Maritzburg.

The Heron's Pool.

Block by
The Glasgow Engraving Co

Photograph by
A. Murray.



Block by
The Manchester Wood Engraving Co , Ltd.

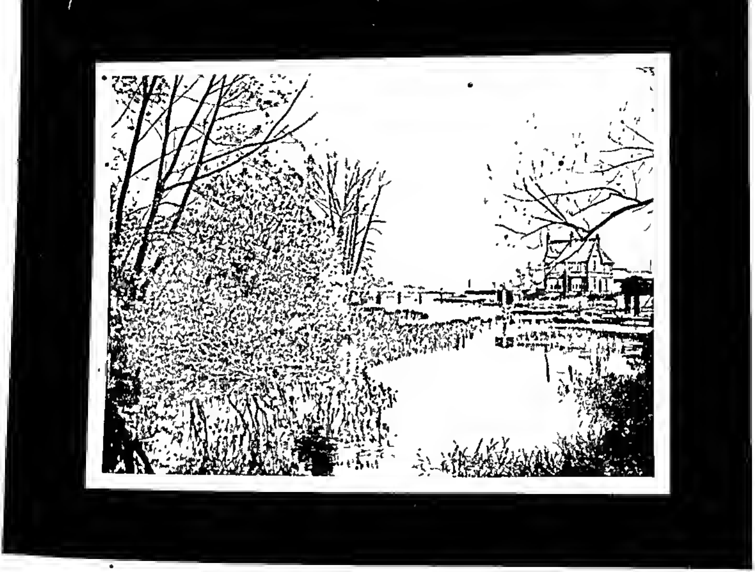
The Road to Minstead, New Forest.

Photograph by
F. C O Stuart.

Chamounix.

Block by
Hood & Co

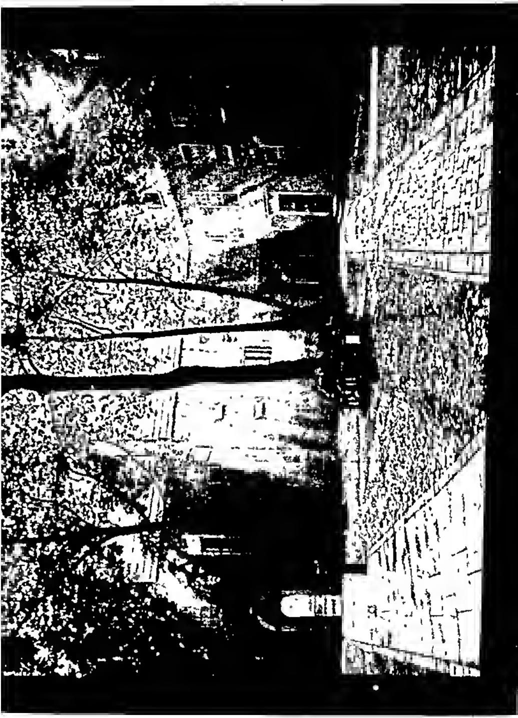
Photographs by
Godfrey Bingley



Block by
London Stereo Co

Goring.

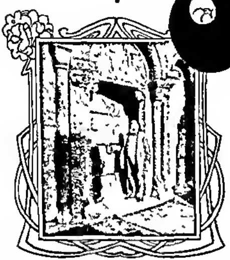
Photograph by
Martin J. Ridley



AN OUTLINE OF THE PRINCIPLES OF TRI-COLOUR PRINTING.

By A. J. BULL,

Of the L. C. C. School of Photo Engraving and Lithography



THE PRIOR'S DOORWAY, ELY

Block by London Stereo Co. — Photograph by J. C. Pythian

OBJECT OF THE PROCESS.—The practical object of the Tri-colour Process is the reproduction of coloured subjects in three printings, and it is of importance to reduce to a minimum the amount of retouching in any form. In considering the optical nature of the process, it is best to use a pure spectrum as a test object, because the light is here separated into its elementary colour components, and the exact nature of the photographic process and the pigments used can be accurately followed.

NATURE OF ORDINARY COLOURS.—It will be useful to consider the nature of the colours commonly met with, which are produced by some of the constituents of white light being removed by absorption when undergoing transmission through a substance or reflection from its surface.

1. REDS.—These are the simplest of the commonly occurring colours, consisting generally of those components of white light which go to form the red end of the spectrum.

2. ORANGES.—The inclusion of the yellow and a trifle of the green of the spectrum in addition to the red produces the various shades of orange.

3. YELLOWS.—A still further extension of the point of absorption towards the blue, so that the colour consists of the whole of the red, yellow and green of the original white light, produces the effect of yellow. All yellows ordinarily met with are of this compound nature.

4. GREENS.—These colours are generally a little more complex, but they consist principally of the spectrum green. A yellow-green colour will generally contain the green and yellow of the spectrum, together with a little red. A blue-green does not always contain the whole of the green, but includes a little blue and sometimes violet.

5. BLUES.—These colours are also somewhat complex. They generally contain the whole of the violet and blue of the spectrum, some of the green, and frequently a little of the extreme red. This latter characteristic is shared by many of the greens.

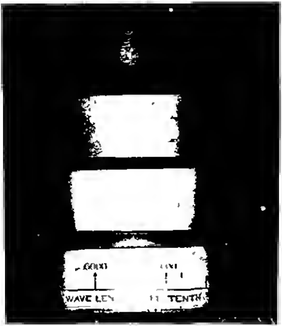


Fig 1 A series of photographs of a normal spectrum, taken through a green filter on a panchromatic plate, the exposures being in the ratios of 1 : 3 : 9 : 27. Owing to the combined effect of the filter and plate giving rise to a distinct maximum, there is great variation in the character of the record with exposure.

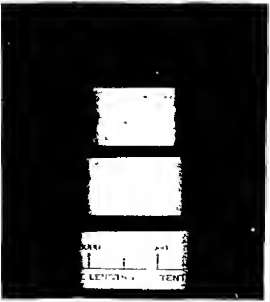


Fig 2 Another series of photographs of the same spectrum and in the same ratios, showing but slight variation in character This was obtained by using a filter having abrupt absorptions in conjunction with a plate evenly sensitive to the region recorded

6. VIOLETS, CRIMSONS, etc.—Pure violet is a colour which very rarely occurs. Pigment violets generally reflect the violet and blue and a little of the extreme red of white light. The mixture in varying amounts of the two ends of the spectrum is characteristic of many colours, including violets, purples, cerises and crimsons.

Light shades generally reflect all colours of the spectrum, but in varying amount.

CHARACTER OF PHOTOGRAPHIC ACTION.—A point of great importance in considering any theory of colour reproduction is the nature of the photographic action to be used. In no case, unfortunately, is there any extended proportionality between the light stimulus and the photographic effect which it produces. In all cases we may divide the action into four or five stages. Firstly, there is the region of perfect recovery, where the light stimulus is insufficient to produce any permanent change in the physical condition of the sensitive substance. The limit of this region is the so-called photographic inertia. The second region is where the curve of action bends upward, so that the effect is more than proportional to the increase in the stimulus, then follows the region where there exists a definite proportionality between these two quantities, and lastly, there is the region where the photographic effect reaches its maximum, and further stimulation tends to produce reversal.

It is of interest to note that in photographic dry plates, the region of proportionality has been found by Messrs Hurter and Driffield and other workers to be greatest in the slower plates, and to almost vanish in the more rapid varieties. Now, in photographing many subjects having an extended scale of gradation, (such as an oil-painting) a fast plate has to be used, because this will render a longer scale of gradation than will a slow plate.

This point has an important bearing upon the rendering of light and dark colours of the same kind and in the same subject. Should a photographic plate in conjunction with its appropriate tri-colour filter, exhibit any distinct maximum, then it will act in a different manner in copying such light and dark colours. This can be traced by photographing the spectrum with various exposures, the exposures being proportional to the varying brightness of a given colour in the original Fig 1 shows a case of this kind, the exposures being given in the ratio of 1 3 · 9 27, and it will be seen that there is considerable variation in the character of the record. Did photographic action follow a straight line law throughout the range practically used, then such filter records could be made to follow definite curves, which would be independent of the exposure. But, as photographic action is a molecular phenomenon, it follows the same general law as other such phenomena, and, therefore, the only way to ensure the same character of colour record, whether the colour is bright or dull, is to have a photographic plate evenly sensitive to the normal spectrum throughout the region to be recorded, and to use in conjunction with it a filter having abrupt absorptions. Fig 2 shows a practical attempt to accomplish this.

REPRODUCTION OF THE SPECTRUM.—For the purposes of tri-colour reproduction, the spectrum may be considered as divided into five regions, three regions each, comprising one of the three primary colours, red, green and blue, and two regions intermediate in position between the primaries, and which are photographically recorded in more than one negative. Referring to Fig. 3, A shows the negative record of the spectrum when photographed through the red filter The region here recorded should comprise as much as possible of the red, and also that part of the spectrum which has been selected as being yellow. In printing from this negative, the ink will be printed not upon the red and yellow

regions, but upon the whole of the regions not recorded, consisting of the colours, green, blue-green, blue and violet. Therefore, an ink must be used which absorbs the red and yellow colours which were recorded and reflects the others. The hue of such an ink is blue-green. The green filter and plate should record the yellow, green and blue-green regions of the spectrum (B), and the correct printing colour can, as before, be found by subtracting these colours from white light. The hue of this colour is a kind of violet-pink, and it will be printed only on the red, and blue and violet regions

The blue filter and plate should record the blue-green, blue and violet of the spectrum, and the printing colour for this will consist of the sum of the colours not recorded, viz., the red, yellow and green and will be printed upon those same regions. (C) This colour is a yellow. In Fig. 3 D, E and F, are shown the three prints from these negative records in inks which are approximations to theoretical requirements And at G is shown the reproduction of the spectrum produced by the superposition of these printings. In considering the nature of these reproduction colours, one must remember that each ink reflects two primary colours. Considering first the reproduction of the primary colours, it will be noticed that the red region, that is, the part of the spectrum recorded only in the red negative, is reproduced by the superposition of the violet-pink and yellow inks. The violet-pink ink absorbs from the white light the spectrum yellow, green and blue-green, the yellow absorbs the blue-green, blue and violet, therefore the only colour reflected by the two is red. The slightly varying hues of this red region of the spectrum are therefore reproduced by a uniform hue consisting of a mixture of these same colours.

In similar manner, the green region, and the blue and violet region are reproduced by uniform hues of their own components. There is no distinction of the spectrum violet, but this is unnecessary.

The yellow region of the spectrum which is recorded both in the red negative and in the green, is reproduced by the printing colour of the blue negative only, viz, the yellow mentioned above. And in similar manner the blue-green region recorded in both green and blue negatives is reproduced by the blue-green ink used in printing from the red negative

It will be seen from above that one can enunciate a circle of conditions as follows —Firstly, the sum of the colours not recorded by the red negative should approximate as nearly as possible in hue to the region of the spectrum where the green and blue records overlap Secondly, the compound yellow produced by the mixture of the colours not recorded by the blue negative should match the region of overlap of the red and green negatives. These matches of colour (which cannot be absolute) can be determined experimentally, and have been found to be as follows.—

The sum of the colours from $\lambda 6900$ to $\lambda 5020$ matches approximately the region $\lambda 6070$ to $\lambda 5820$, and the sum of the region from $\lambda 5820$ to $\lambda 3970$ also matches approximately $\lambda 5020$ to $\lambda 4920$ From these colour matches it follows that the red filter should record evenly from $\lambda 6900$ to $\lambda 5820$, the green filter from $\lambda 6070$ to $\lambda 4920$, and the blue filter from $\lambda 5020$ to $\lambda 3970$ *

As these points dividing the spectrum occur where the colour changes most rapidly, their exact determination is a matter of some little difficulty and will vary slightly with individual eyes

THE BEST PRACTICAL LIMITS FOR THE FILTERS —So far as practical work in three-colour half-tone is concerned, it has been found advantageous to extend

* "The functions of tri-colour filters," by A J Bull & A C Jolley, "British Optical Journal," January, 1904

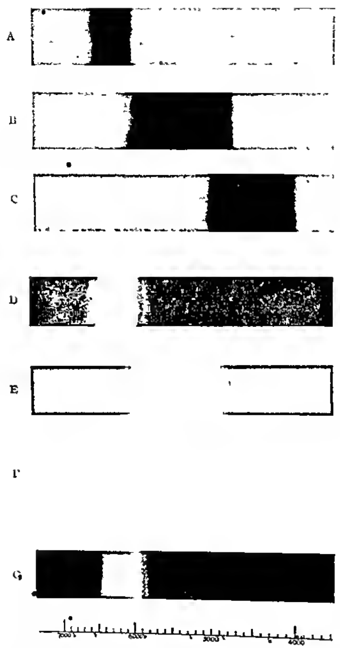


Fig. 3. Reproduction of an almost normal spectrum by the tri-colour process. A Red negative; B Green negative; C Blue negative; D Positive print from A in greenish blue ink; E Positive print from B in violet-pink ink; F Positive print from C in yellow ink; G Reproduction of the spectrum. These filters are not designed to copy the spectrum accurately, but to render ordinary colours well. It will be noticed that the whole of the red up to λ7000 is not recorded, owing to the insensitiveness of photographic plates to the extreme red. The record terminates at λ4000, the ultra-violet not being photographed.

the record of the green filter further into the blue. A green filter recording evenly from λ6000 to λ4800 gave somewhat better results in the reproduction of dark-blue colours than one recording from λ6000 to λ5000. It is not in practice possible, with the orthochromatizing dyes yet available, to record the red as far as λ7000. About λ6500 appears to be the limit of the red record when the spectrum yellow is recorded at the same time. With these qualifications the limits for the filter records given above appear to hold good in practice.*

REPRODUCTION OF ORDINARY COLOURS.—Taking the classification of common colours as given above, the manner in which they are reproduced is as follows:—

The reds are only recorded in the red negative and are hence rendered by the printing colours of the other two negatives—violet-pink and yellow—being printed full strength on each other, there being only high-light dots of blue-green.

Since the oranges contain a little green in addition to the red they are slightly recorded in the green negative as well as in the red. They are therefore rendered by full strength yellow, part strength violet-pink and the minimum quantity of blue-green inks

Neutral yellows are rendered by full-strength yellow and high-light dots only of the other two inks, as they are equally recorded in the red and green negatives and not at all in the blue one.

Greens are in general recorded mainly by the green negative and are reproduced by the blue-green and yellow inks with only small quantities of the violet-pink ink.

The complex blue colours are fully recorded in the blue negative, partly in the green and not at all in the red one: the small amount of red that some blues do reflect not being recorded, as it consists only of the extreme end of the spectrum to which no plate is at all sensitive

Crimsons and purples chiefly affect the red and blue negatives and are reproduced by the violet-pink ink together with varying but smaller amounts of the other two.

THE PRINTING COLOURS.—As previously pointed out the printing colours should be such that they consist of the spectrum colours not photographically recorded by the particular negative That is, the inks should be perfectly transparent to the colours not recorded and perfectly opaque to the rest.

This actual colour can be obtained and projected on a screen. To do this, a negative is taken of a spectrum, with the particular filter and plate, intensifying it if necessary, placing the negative back in the spectrum, so that it blocks out the light previously recorded and re-combining to a uniform patch of colour the light which it does not obstruct.†

It has not been possible up to the present to obtain printing inks of exactly the required character. Of course, with an ink, there is always a certain amount of surface reflected white light, but this is of small importance. In almost all cases the inks are not transparent enough, which means that they obscure to some extent colours printed under them. For this reason it is usual in practice to print the most opaque ink first, and the most transparent one last. Then, again, it is very difficult to get inks to completely absorb any particular colours, or to completely reflect others. The ink which generally departs the most from theoretical requirements is the blue-green; it is generally fairly transparent to

* "The practical performance of tri-colour filters," by A J Newton & A J. Bull, Photographic Journal," October, 1904

† The Colour Patch Apparatus, by A J Bull, PROCESS YEAR BOOK, 1903

blue and violet, as it should be, but never transparent enough to green, so that in practice this ink is generally more blue than blue-green in colour and is spoken of as the "blue" ink. A slight transparency to red is also a common fault. In the case of the violet-pink ink, it is rarely transparent enough to blue and violet, and is often in fact nearly red in hue. A very usual defect with this ink is that it reflects too much of the spectrum yellow, so that the red produced by it when printed on the yellow ink is too orange in hue. The abruptness of absorption which should be sought after is not often seen in trichromatic inks except in the case of the yellow.

ADJUSTMENT OF FILTERS TO INKS.—It is sometimes stated that the filters should be adjusted to the inks used, but if the filters are altered to reproduce any commercial inks perfectly, then it will be found that the reproduction of other colours will suffer, and more will be lost than is gained.

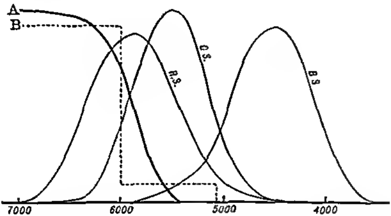


Fig 4 Diagram showing how some colours may suffer a degradation with the sensation of white in the process of reproduction R S, G S and B S are the red, green and blue sensation curves A is the luminosity curve of an orange pigment and B that of the orange colour by which it is reproduced It will be noticed that the latter extends further towards the blue and stimulates more of the blue sensations, which together with the equivalent amounts of red and green sensations produces in the eye the sensation of a slight addition of white

DEGRADATION OF THE COLOURS IN THE PROCESS OF REPRODUCTION.—It has several times been pointed out that owing to the triple sensation nature of colour vision there is often a degradation of the colours in the reproduction generally with the *sensation* of added white light The defects actually brought about by this are minute compared with those due to imperfect plates, filters and inks With abrupt filter records they occur to some extent in the reproduction of the spectrum, but almost vanish in copying ordinary colours One of the worst instances that could occur would be that of an orange. This would be recorded in the red and green negatives, the red record being greater than the green It would, therefore, be rendered in the printing by full strength yellow ink, part strength violet pink ink, and only high-light dots of blue ink. This would mean that if A, fig 4 represented a luminosity curve of the original orange, it would be reproduced by some such curve as B, if the inks were perfect. Now, it will be noticed that although these both have approximately the same amount

of green in their compositions, that in the reproduction extends further towards the blue, and would therefore stimulate to a greater extent the blue sensation in the eye, which, together with the necessary amounts of red and green sensations, would give the appearance of a slight addition of white.

Degradation of this type is so slight that its presence does not yet appear to have been actually detected with any degree of certainty.

THE GEOMETRICAL LAW OF ABSORPTION. — A disturbing factor in the accuracy of three-colour reproduction might occur when colours having gradual absorptions* were printed in varying amounts upon each other, due to the geometrical law of absorption. The actual effects have not been worked out in any great detail, but as has been previously pointed out they practically vanish when using inks with abrupt absorptions for half-tone work, because the ink is printed the same strength all over.* There is, however, a slight variation in the distribution of the ink in each individual dot.

FILTERS TO COPY THE SPECTRUM EXACTLY.—It may be pointed out here that apart from the impossibility of making filters to imitate the spectrum exactly, except at perhaps one critical set of exposures, there is another reason why such filters would not work in practice. To copy the varying hues of the spectrum, the filters must follow definite curves which gradually slope over each other, the blue record, for instance, having a maximum somewhere in the blue and extending some little distance into the green, as in certain calculated curves If a full yellow were copied by such filters, it would not only be fully recorded in the red and green records, but it would also to some extent be recorded in the blue negative: the result would be that the colour would be reproduced by the minimum quantities of the red and blue inks and only part strength yellow, so that, in this case, there would be a real degradation of the colour with white light Similar effects would occur with certain other colours

THE EFFECTS OF INCORRECT FILTERS.—The following few instances will indicate the effects of common defects in the filter records.

1. The red filter records too much yellow-green, and consequently not sufficient red.

The effect of this will be seen in the rendering of reds themselves, as they will not be sufficiently recorded on the negative by the time the whites are fully exposed, and will therefore be dull, due to the printing of too much blue ink upon them On the other hand the greens will have too little blue ink.

2 The band of comparative insensibility in the Erythrosin type of plate will, if allowed to manifest itself in the filter record, cause a degradation of dark greens by too much red ink, the yellow-green of the spectrum being better recorded than the blue-green.

3 Should the green filter record only a narrow band near the blue-green then the yellow-green constituents of many green shades will be missed in the negative, so that they will not be as fully recorded as they should be, and will therefore have too much red ink on them.

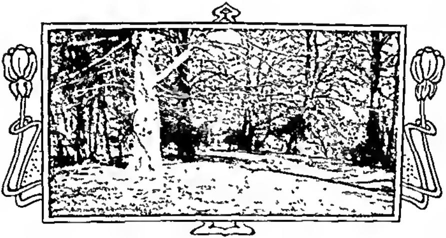
4. If the blue records the ultra-violet to any very appreciable extent, as well as the blue and violet, then any pure blues that occurred would not be fully recorded as compared with the whites, while many reds, which reflect ultra-violet will be recorded, and would, in the reproduction, suffer from insufficient yellow, which would give them a violet tint.*

5 An unrecorded gap in the yellow-green has the effect of rendering orange colours too red, because they are not sufficiently recorded in the green filter.

* "On the application of Maxwell's curves to three colour work," by R S Clay, D Sc., Pro Royal Soc Vol. 69.

6. An unrecorded gap in the blue-green, if about the position λ5000, will have the effect of rendering dark blues too violet, because of their insufficient effect in the green negative.

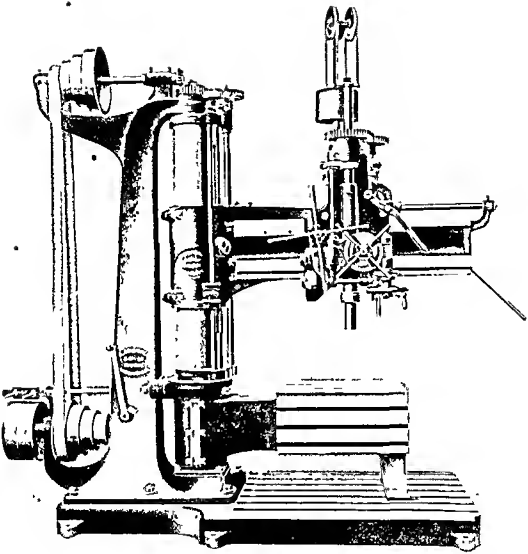
In conclusion it is interesting to note that the theory of tri-colour printing as outlined here is independent of the nature of the machinery of colour vision, and has been verified by extended practical tests. While it is always recommended to work as close as possible to theory, many theories of tri-colour printing break down in practice.



THE ROAD THROUGH THE WOODS

Block by CLARKE ENGRAVING CO

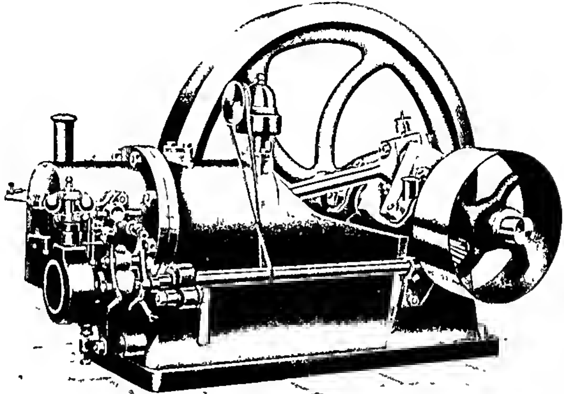
Photograph by G. WATSON



Catalogue Illustration.

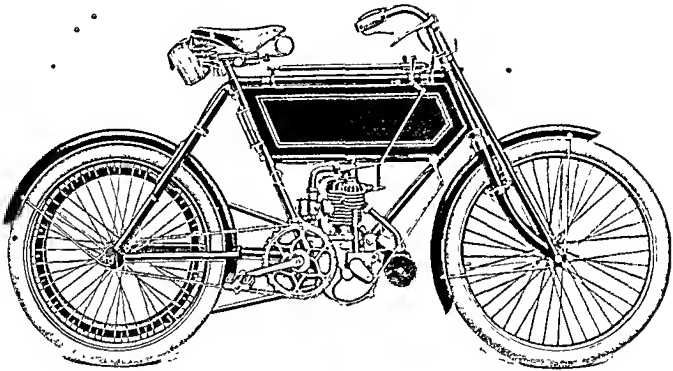
Photograph and Block by
Wallace & Gilbett

By kind permission of
Messrs. James Archdale & Co., Ltd



Drawing by
Warner & Winst…p

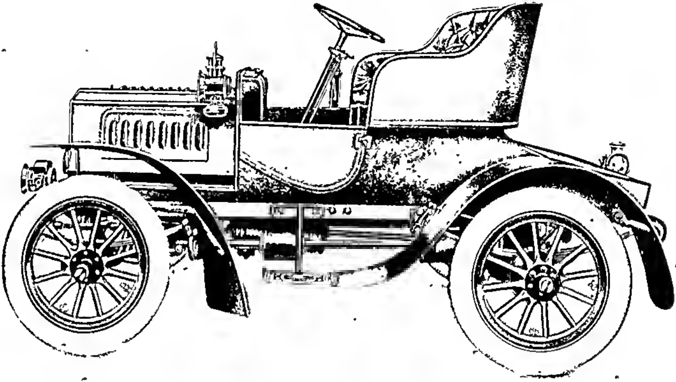
Catalogue Illustration.



A Modern Motor Bicycle.

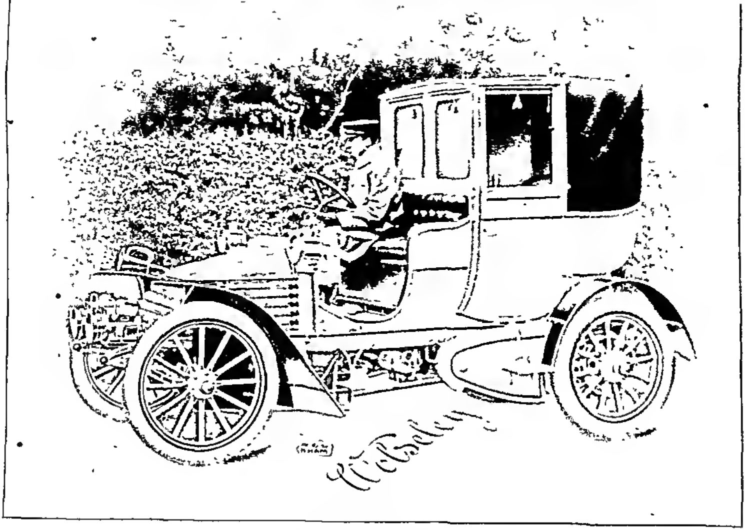
Block by
The Half Tone Engraving Co. Ltd.

Original worked up by
Warner & Winship



Photograph Retouching and Block by
Ashworth & Meredith

An Up-to-Date Motor Car.

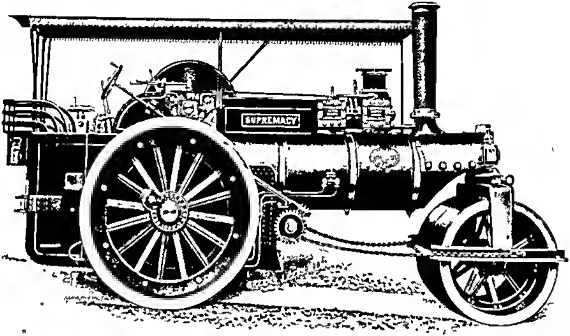


Catalogue Illustration.

(By kind permission of the Wolseley Tool and Motor Car Company Ltd.)

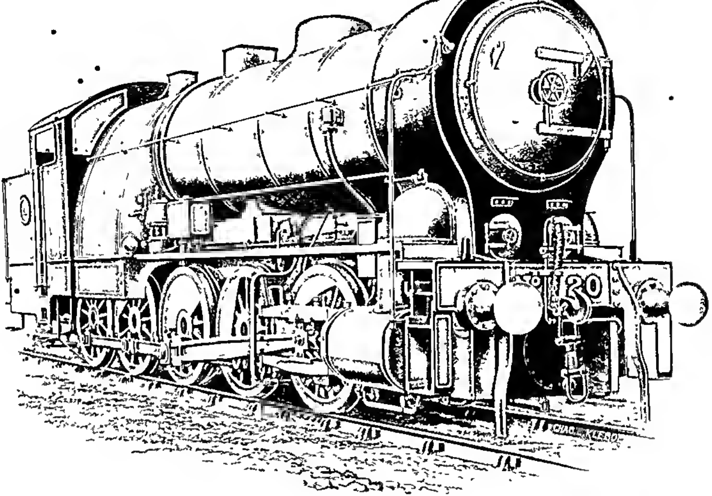
Block by
Wallinge & Gilbett

Photograph by
H. J. Whitlock & Sons Ltd



Original and Block by
The Manchester Wood Engraving Co. Ltd

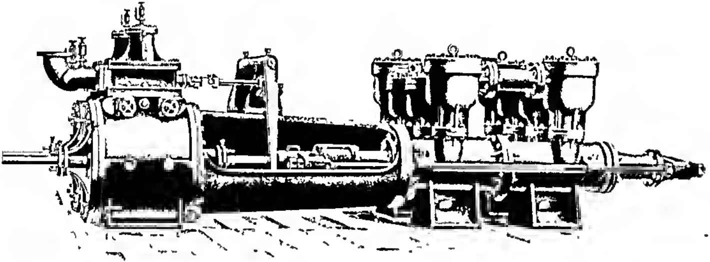
Catalogue Illustration.



A Monarch of the Railroad.

Block by
Scottish Engraving Co. Ltd.

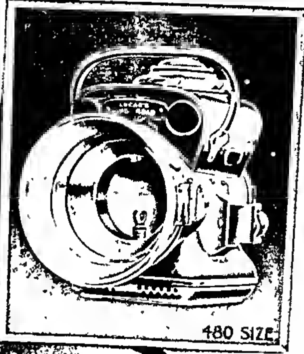
Original Retouched by
Chas. E. Kleboe



Block and Original by
Charles W. Harness

Catalogue Illustration.

"KING OF THE ROAD" HEAD LIGHT



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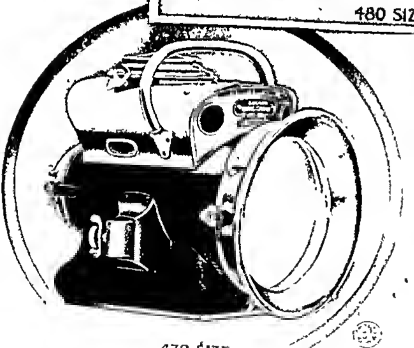


470 SIZE

Design and Blocks by
The Tone Photo Engraving Co

By kind permission of
Messrs Joseph Lucas, Ltd

THE RESPONSIBILITY OF THE MACHINE BUILDERS.

By Geo. E. Dunton, New York.

Lake Lugano

k by Arc Engraving Co Ltd   Photograph by A. V. Kenah

In the building and selling of modern machinery in all lines of industry, the manufacturers and sellers have a great responsibility, which must be assumed by them, and by them only. I am sorry to say that at the present day, there exists in some quarters a disposition to give the purchaser, not the very best that can be designed and constructed, but a subterfuge bad in design and faulty in construction, which no matter how well used or carefully taken care of, is always broken or out of repair. Cheap machinery is a very poor investment at any price, causing more or less unpleasant complication between manufacturer and purchaser More unfortunate than the purchaser is the operator of this class of machines, for he is not only expected to produce results irrespective of conditions, but oftentimes blame falls upon his shoulders that clearly belongs in the designing room of the factory which creates the machines, and the manufacturer who resorts to such unscrupulous expedients to cover his own shortcomings can only hope to flourish for a time.

A manufacturing concern having a reputation which it has taken years to establish, who have secured their prestige on account of the sterling quality of their productions, do not, because they cannot afford, practise any manner of false economies in the designing or construction of their machinery, and the most valuable guarantee that a line of machines can possibly have is the reputation which they bear among the majority of the workmen who operate them

In the construction of modern electrotype machinery particularly, the designers must keep these four potent conditions or factors conspicuously above "the board" efficiency, stability, symmetrical construction and simplicity. Builders who produce only the best never consider the enormous cost of their first creations, the objective is the best and only the very best which money and skill are able to create or develop, and each machine which follows is built with equal care, and every possible improvement which manipulation demonstrates to be of value is adopted and added.

On the other hand, machines are created which have not the slightest claim on any of the potent conditions enumerated above, other than possibly the embodiment of simplicity, which is carried to the most primitive extreme. The very poorest grade of iron forms the castings. Paint and putty conceal misfits and defects There are the most flagrant violations of established and conceded mechanical laws and principles without even apology or excuse. When such

machines break down or go completely to pieces, as they many times do in an alarmingly short space of time, the responsibility, as previously stated, is many times and unjustly placed on the shoulders of the unfortunate operator, who, unless he happens to be a mechanic, must generally take the blame.

In the designing of machinery for the electrotyper the builder has two distinct propositions to deal with in matter of construction. First, in machines having reciprocating motions, provision must be made for overcoming, in the moving parts of the machines, that negative though universal property of matter known as inertia; it is the property that matter cannot of itself change its own state of motion or of rest. If a body is in motion, this motion, or the direction of its motion can only be changed by the application of some force acting in an opposite direction.

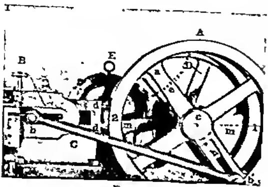


Fig 1

Second, in machines having spindles or shafts which run at a great speed, provision must be made to preserve unit velocity in all parts of the spindle and whatever it may carry, that is, it must be in radial balance to maintain an equilibrium of stress along the radius of the curved path described by the body. Consequently one of the most difficult problems in the designing of machines is the balancing of moving parts First, to counteract the effects due to inertia Second, to prevent destruction by centrifugal force

Figure 1 represents a machine used by electrotypers for taking the first cut from the back of the plates, commonly known as a plough or roughing machine It has a very decided reciprocal motion, meaning a motion which changes or alternates in regular succession The figure does not show the entire machine, only portions of the tool carriage and driving-wheel, but sufficient to define our point B is a tool carriage connected to the driving wheel A, by the connecting rod C, through the crank-pins b b When this machine is put in operation the tool carriage B moves forwards and backwards on the ways d d, propelled by the rotation of the wheel A At two points in the rotation of the wheel which brings the crank-pin in the relative positions 1 and 2 on the line m n, the tool carriage must change or reverse its motion, or the direction of its motion when by the

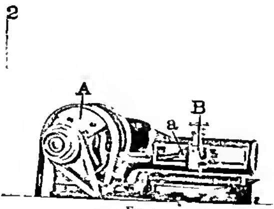


Fig 2

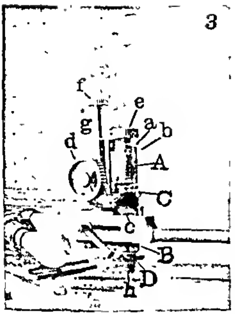


Fig 3

momentum imparted during the stroke its tendency is to continue moving in the same line in which power has been applied. In order that the machine shall run steady there must be some means of establishing an equilibrium when the tool-carriage reaches the end of each stroke, or when the crank *b'* passes the points 1 and 2. on the line *m m*, sometimes spoken of as "dead-centres." On the large printing presses having reciprocal beds, an air compressor is arranged at the end of each stroke to absorb the momentum of the bed. On locomotives, the heavy drivers (wheels) are counter-weighted radially opposite their crank-pins, to overcome the inertia of their pistons, due to the terrific pressure or force exerted on them by the steam from the boiler ; notwithstanding the enormous weight of the train. By referring again to figure 1, we shall find that the rougher shown has no provision whatever to counter the momentum of the tool-carriage B, consequently the inertia of the tool-carriage affects the entire machine, not only making it unsteady, but wearing the gear D and the pinion on the motor E unevenly, finally stripping the former In order to overcome the damaging results of inertia in the tool-carriage, it is necessary to add to the wheel D, diametrically opposite the point *b'*, shown by the dotted lines *e* at the extremity of the spoke *a* , a mass equal to the mass B multiplied by the square of its velocity

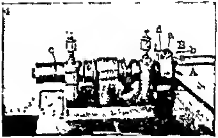


Fig 4

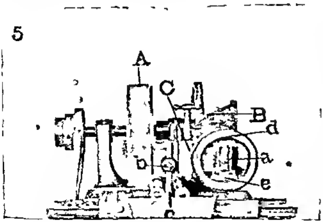


Fig 5

divided by the resistance of the work done by the tool It is quite true that this addition does not overcome in any degree the strain upon the crank-pins *b b'*, but it prevents strain upon the shaft *c* and also stops the vibration of the entire machine.

In figure 2, which is a smaller roughing machine, and run at a higher rate of speed, it was impossible to keep it fast to the floor on account of the inertia of the tool-carriage B. Weights of

lead were cast and bolted under the rim of the driving wheel A, as shown in the figure, resulting in the steadying and smoother running of the machine. The builders of machinery who neglect this vital point in the construction of reciprocal machines are either ignorant of mechanical principles in the designing of machinery or they wilfully conspire to produce a cheap article.

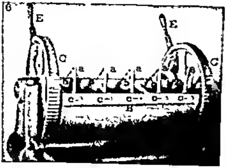


Fig 6

In the construction of machines having high speeded spindles, the greatest care and attention must be given to the fitting and balancing of the moving parts to insure smooth running and to guard against destruction due to centrifugal force. In the well-known routing machine the spindle carrying the cutter makes ten thousand, and sometimes more, revolutions each minute. If the spindle is for reason of poor construction or from carrying attachments which are radially out of balance with the axis of the spindle made heavier at one side than at other radial points of its circumference, the angular velocity at that point will be greater than at all others of equal distance from the axis, and there is a tendency for this heavier part to leave the curved or circular path, due to inertia. But as the direction of its motion is fixed the force acting on it has a tendency to throw it further from the centre or the axis of rotation, describing a greater cycle than the lighter portions of the spindle, consequently the spindle does not turn on its true axis. The result is a disagreeable unsteadiness in the running of the machine, heating and destruction of the bearings. Figure 3 represents a router head in which such conditions existed The spindle D was made of hollow tubing having a $\frac{1}{16}''$ wall Through this spindle extended the stem of the tool chuck *h*, terminating in the tightening hand wheel *e* Owing to the vibration it was almost impossible for the operator to guide the cutter, while in a very short space of time the entire head was ruined. At the request of the writer the head was reconstructed The bearing sleeves were fitted into the cases A and B, on a taper and securely held by collets *b*, fastened by second (jam) collet *a*. The spindle D was made of, if possible, heavier tubing having an aperture just large enough to admit the chuck stem, and the hand-wheel made larger and heavier to act as a balance wheel *e*, to absorb any vibration which might be caused by the cutting tool. A solid steel pulley C was substituted for a leather-covered affair, and a phosphor bronze ring *c* took the place of a fibre collar to take up

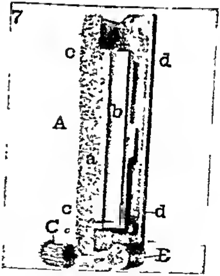


Fig 7

lateral wear in the spindle. A large lock wheel *d* was put in the place of a smaller one, so that the feeding mechanism of the cutter could be positively held in place without jamming or disfiguring the wheel *d*, by the use of wrenches or pincers or worse, a hammer.

Figure 4 shows the spindle and cutter head of a side-plane or bevelling machine, in which the cutters deserve specially severe comment. Their sharpening or regrinding is absolutely beyond the ordinary workman. In shape the cutting edge embodies three angles and one arbitrary dimension. The angles *a b* and *b e*, give the cutting edge to the cutter, while a straight line from the point *b*, to the base of what would be the angle *b e*, gives that dimension which governs the uniform setting of the cutters. The third angle, which cannot be seen in the figure, is at the back of the cutter from the toe or cutting edge to the heel, and upon it depends the clearance of the machine. The set and adjustment is through the cap-screw *d*. The only way to ensure uniformity in the grinding is to use a jig in connection with a surface grinder, which virtually means sending them to the builder's factory every time they need grinding. The fibre collar or ring *c*, is used in this machine to take up the lateral wear of the cutter spindle.

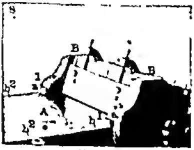


Fig. 8

In the machine shown in figure 5, which is an end elevation or view of figure 2, a startling design or lack of design appears which would create an impression that the construction just happened without premeditation. The tool-carriage C carries the cutter *e* The point at which power is applied or transmitted to the carriage from the crank on the driving shaft is directly behind the point *a* The carriage is guided by the gibbs *c* and *d*, which travel in circular ways, consequently they are the very worst possible design to take the side strain on the connecting rod pin shown at *a*, in figure 2 The cutting tool in this machine should be directly in front of or in line with *a*, figure 5 As the machine operates the strain on *a* equals the square of the velocity of C times its weight plus the distance from *a* to *b* and the resistance at the point *c*.

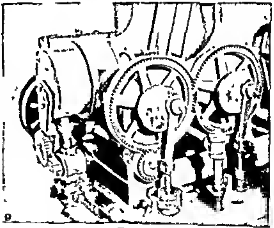


Fig 9

Figure 6 shows a curving machine for bending large plates to fit the cylinders of the rotary presses, that are now so generally used throughout the printing world As the machine was built the edge of the plate to be curved was placed under the edge of a dog attached to the cylinder rigidly, and the cylinder turned through half a revolution which, at the same time, carried it across the bed of the machine by means of gears which mesh into racks at either side In putting the plate into the curver, the handles are

pulled forward toward the observer, bringing the dog B down to the bed of the machine. As the builders send this machine out it is impossible to curve the edges of the plates. The writer being unfortunate in having one, and also compelled to use it, the simple improvement herewith described was added which makes the machine very efficient, though it is not by any means the best that is now built. The dog B was taken from the cylinder A and two elongated teeth or ribs made on its front edge. Five eye studs screw into B, moving freely through holes in the cylinder A and locked fast to B, by the jam nuts *c c c c c*. Small cam or eccentric levers straddle the eyes of the studs. The operation is simple, the end of the lever *a*, when thrown down to *b*, draws the dog closer to the cylinder. With a plate under the dog its edge is locked and held firmly to the cylinder, consequently the curve is extended to the very edge of the plate.

In regard to the quality of material which the builder puts into his machines there is no excuse for any such manifestation as depicted in figure 7. Unless as previously stated, there is a predisposed motive to seek only immediate profit, certainly a manufacturer could not be sane and hope for anything else. A shows a piece of the bed from a moulding press, the fracture *a* being directly across the toggle seat *b*. It is not necessary to add comment, the quality of the iron used in the casting as shown by the fracture tells a story more convincing than lengthy argument B, in the same figure, shows the same quality of metal which was taken from a break in another press widely separated from that from which *a* was taken. The wearing qualities of this grade of iron are shown in figure 8, which is a plate shaving machine, in which A is the stationary bed. The carriage B travels very slowly on the brass gibbs *a a*, over the ways *b b*. Notwithstanding the fact, that this machine has had the very best of care and often overhauled, the oiling never neglected, the brass gibbs have worn into the iron at the points *b*-1 over $\frac{1}{32}$", which gradually diminishes beyond *b*-2 to the end, where the bed shows no wear

Figure 9 shows the pumps, ram and some other parts of an innovation to the line of American freaks. This is called a "hydraulic toggle" moulding press. It is doubtful if it would be possible to create pressure enough with this machine to break anything

An expensive hobby in this country is direct motor driving of machinery. Small machines which do not run over 25 per cent. of the day may be "direct connected" and run at a saving or without loss at least But at their best the smaller motors, two-horse and under, do not convert over 50 per cent of the electrical energy to mechanical at their driving pulleys Consequently if machines are to be run nearly continuously, or even half the time, it will not be profitable to direct connect them to motors By actual test, it has been found to cost twice the sum per month to run an electrotype plant from direct connected motors, than it would to hire the same rated horse-power from a shaft in one large building furnishing power If you are in business for profit, cut out the small direct connected motors.

Foreign buyers should be very cautious in the purchase of American-made machinery, for it is not always what it is represented to be It would be advisable to have some representative on this side to inspect machines that have been in use and tried in many different places before purchasing an unknown quantity from an unknown manufacturer

SOME AIDS TO THE PRINTER.

By Madeley Mole.

Warped Blocks; Cause and Prevention.

Miss Evelyn Millard

Block by A. E. Dent & Co. — Photograph by Alfred Ellis & Walery

ALTHOUGH mounts be made from well-selected and thoroughly seasoned wood, yet when one side only of the wood is covered with a metal plate protecting that side from atmospheric changes and the washes used in printing the natural expansion and contraction of the exposed side inevitably pulls the block out of truth.

Varnishing will, in a measure, prevent this, but the only reliable process we know is to cover the under side of the block with a film of mechanical underlay, which is quite impervious to moisture and the block is thus equally protected on both sides, and remains true under the most trying conditions.

Blocks treated in this way have been purposely exposed to the sun for months, and have remained absolutely true, both sides being equally protected.

How to get "Register" in Three-Colour Printing.

Now that three-colour printing is coming more and more into general use, both for commercial purposes and book illustrations, the question of register is of vital interest, as without true register the beautiful effects possible by this process are often missed, and in their place merely unattractive smudges produced, causing serious loss both in pocket and reputation.

The chief three-colour printers have now solved the difficulty of register by using the "Perfect Register" quoin; every block is held in the forme by these quoins only, and they are so made that each individual block can be moved in any direction without being loosened, so that block after block can be brought into perfect register without the slightest disturbance of the others. Even if the paper "gives" these quoins enable the printer to follow and overcome the difficulty.

By this simple means bad register in three-colour printing will, we hope, soon be a fault of the past.

Two-Colour Flat-flat Design by
Edward J. Burrow,
Artist and Publisher, Cheltenham,
for "North Wales Official Guide."

Vignettes.

How often we have seen the harsh finish of a vignetted edge, spoil the effe of an otherwise beautiful block, and where electros have to be used the resu has generally been deplorable in this respect.

Many leading houses are now using a simple and inexpensive means overcoming this difficulty; it is a machine that rapidly chamfers the under sic of the plate where vignetted, and the extreme edge is bent just below the print ing level, so that even in the hands of an unexpert pressman a harsh outlin is impossible, and a great amount of hand work saved.

The Adjustment and Clothing of a Printing Cylinder.

The idea of its being within the power of the machine minder to adjust th height of his cylinder is clearly a legacy from a period when printing was roughly done.

The cylinder takes its speed from the table, and its extreme surface when fully clothed must travel at exactly the same speed as the table, neither faster no slower. Consequently its circumference, when clothed, must be to an exact measurement; if there is one sheet too much on, its circumference will be too great and will travel faster than the table, and instead of giving a sharp impression will scrub the forme to the ruin of fine blocks.

Equally fatal is a sheet too few, as the circumference of the cylinder will then be too small, and it will travel more slowly than the table.

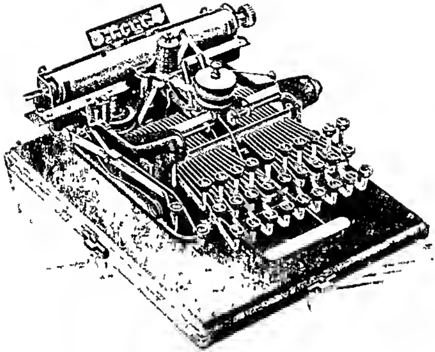
Clearly there is one true height for a cylinder, and the slightest adjustment *from that is only a departure from accuracy.*

Cylinders should run on type-high steel bearers, and be clothed to that, and not be provided with any means of adjustment.

Buttermere

Block by
W. F. Sedgwick Ltd.

Photograph by
Hinckley



MODERN CATALOGUE ILLUSTRATION.

ERLAYED HALF-TONE,

BY . . .

THE ARTHUR COX ILLUSTRATING CO., LTD.,

BIRMINGHAM.

METALLIC OVERLAY.

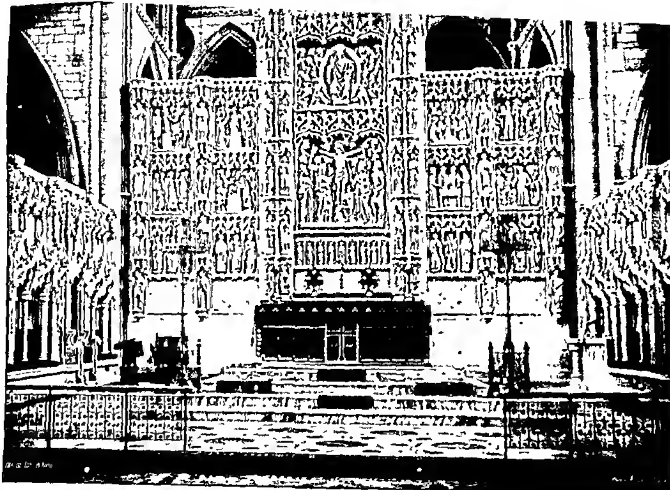
"THE ATHERSTONE."

INTERLAYED HALF TONE
BY
THE ARTHUR COX ILLUSTRATING CO. LTD.
PRINTED WITH THEIR METALLIC OVERLAY. BIRMINGHAM.

HOMEWARD BOUND.

INTERLAYED HALF TONE
BY
THE ARTHUR COX ILLUSTRATING CO LTD
BIRMINGHAM
PRINTED WITH THEIR METALLIC OVERLAY

FROM CARBON ENLARGEMENT,
BY
BERNARD MOOR, ESQ.



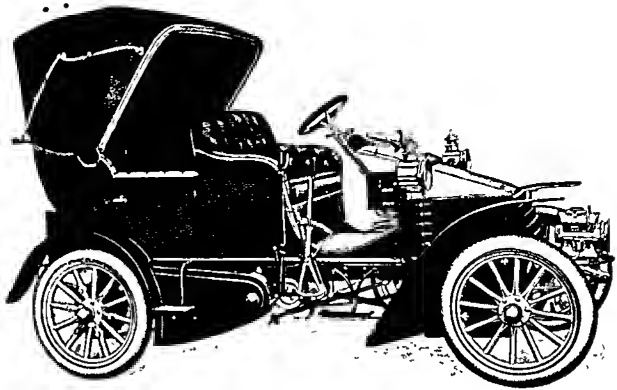
REREDOS, TRURO CATHEDRAL.

INTERLAYED HALF TONE,
BY

THE FISHERMAN'S LASS.

ED FOUR COLOUR PROCESS BLOCK,
BY
HE ARTHUR COX ILLUSTRATING CO. LTD
BIRMINGHAM
WITH THEIR METALLIC OVERLAY

FROM CARBON ENLARGEME
BY
GRAYSTONE BIRD ESQ



MODERN CATALOGUE ILLUSTRATION.

INTERLAYED COLOUR PROCESS BLOCK
BY
THE ARTHUR COX ILLUSTRATING CO. LTD
BIRMINGHAM

PRINTED WITH THEIR METALLIC OVERLAYS

MEADOW SWEET.

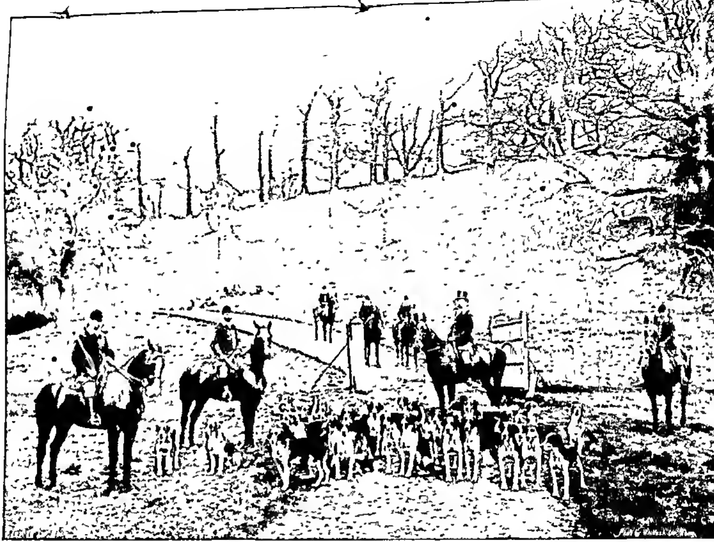
Interlayed Two-colour Half tone
by
THE ARTHUR COX ILLUSTRATING CO Ltd
BIRMINGHAM
Printed with their Metallic Overlay

From Carbon Enlargement,
by
Graystone Bird, Esq.

THE JOURNEY'S END.

NTERLAYED HALF-TONE,
BY
THE ARTHUR COX ILLUSTRATING CO LTD
BIRMINGHAM.

NTED WITH THEIR METALLIC OVERLAY



"THE VINE."

Interlayed Half-tone.
by
THE ARTHUR COX ILLUSTRATING CO. Ltd.
BIRMINGHAM
Printed with their Metallic Overlay

The perfect plate, however, has yet to come; there is only one maker, to the best of my knowledge, who has approached it up to the present, and that only by studying the special requirements of the business. For the benefit of plate makers who are interested in the subject, I would like to state what my ideal plate should be like. It should be fast, that is, of course, only relatively, I should say somewhere about 4 to 5 times faster than the plate usually made; it should be thinly coated but not too thin, as then it becomes too tender to handle. Also it should be non-halation and colour sensitive, sufficiently so to make it possible to use a yellow filter for copying coloured originals; it must be capable of ample density, combined with extreme clearness, yet the gradation must not be too steep or the middle tones will suffer, and finally, it must be of the finest possible grain.

Surely, after all these years of experience, it is not impossible to produce such a plate. I am convinced that the future will see the dry plate used more and more for half-tone work, it has so many advantages: it only remains for the plate makers to give the question the attention that it deserves.

"What are the Wild Waves Saying?"

Block by
Anglo Engraving Co., Ltd.

Photograph by
H. G. May

MORE ABOUT ULTRA-VIOLET LIGHT AND COLOUR SCREENS.

By Frederic E. Ives.

A Choice Brand

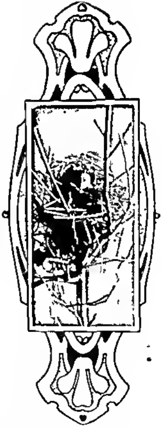
Block by H. Rheinlander & Co. — Photograph by Byrne & Co.

BY an eminent photographic authority the remarkable statement was once made that the actinic power of the deep violet and ultra-violet rays was so feeble on ordinary gelatine-bromide plates, that they did not *commence* to act until after sufficient exposure had been given to make a vigorous negative by the action of the blue rays. Even if their action not relatively feeble, why they should was act simultaneously, in proportion to their power, when mixed with other spectrum rays, is a question I would have liked to hear that authority attempt to explain

It is not true, however, that the action of those rays is relatively feeble. In a photograph of a perfectly normal spectrum of diffused daylight, made through a photographic lens, the strongest action is in the violet instead of the blue of the spectrum, and the joint action of the violet and ultra-violet rays is certainly greater than the joint action of all the other spectrum rays *

The bearing of this fact upon the selection of colour screens was pointed out in an article published in the Journal of the Photographic Society of Philadelphia June, 1895, page 35

There is, however, another reason why it is important



Woodmouse in Nest

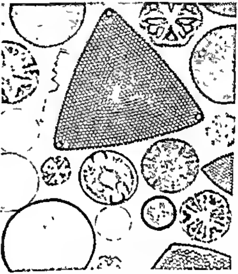
Block by Philipson, Son and Shillfter — Photograph by Hermann Lea

* *Photographic Journal*, April, 1903, p 119 In this connection, it should be understood that the transparency of photographic objectives to violet and ultra-violet light varies from the very great transparency of the non-achromatic objectives of thin crown glass to be found in some of the Kodaks through achromatic lenses made of some of the new Jena glasses, up to large objectives of the old type containing thick lenses of yellowish flint glass.

to recognise the action of these rays, and to know when and how to eliminate them. There are optical systems with which it is sometimes desired to make photographs, which are capable of forming sharp images by the brighter spectrum rays, but not by the violet or ultra-violet. Such a system is the combination of a low-power achromatic microscope objective with a Huyghenian eyepiece.

I submit herewith two photographs of a group of diatoms made with such a combination, one with an isochromatic plate and brilliant yellow colour screen, the other with an ordinary plate and chrysoidine screen (without change of focus), both in diffused daylight. The first photograph is perfect because it is made with the yellow-green spectrum rays for which the combination is well corrected, and the second is very, very bad, because it is made by the action of the ultra-violet rays which chrysoidine transmits, and for which the optical combination is not "corrected."

Taken with Chrysoidine Screen



Taken with Brilliant Yellow Screen

I have selected these two examples because the first was made in accordance with recommendations to meet these conditions which I made as long ago as in 1890, while chrysoidine is a dye which others have strongly recommended for colour screens.

As we are not dealing here with any question of colour rendering but only of definition, it is not usually necessary to eliminate the blue rays if the violet and ultra-violet are eliminated, and I find that the dry esculin screen which I described in "Camera Work," July, 1904, page 44, by eliminating the violet and ultra-violet rays only, secures sharp images on ordinary plates with the same objective and eyepiece.

effectively at relative apertures of $\frac{1}{5}$, in fact at $\frac{1}{4}$ and even $\frac{1}{3}$, of their focal lengt It will not, however, be imperative to insist on extreme sharpness of image, one would rationally be satisfied with that degree of sharpness which the coars grain of the highly sensitive dry plate allows to be utilized to advantage.

2. The Flatness of the Image.

The requirement as to availability of a wide image angle imposes, general speaking, a certain limitation in this direction, for which reason we conte ourselves with a reproduction objective embracing an angle of moderate degre If, for instance, in the case of reproduction on the scale of the original an objectiv of 500 mm. focal length covers a 40×50 cm plate, or an objective of 1000 mr focus one of 70×80 cm, the image angle obtained (one of from 30° to 35°) woul be considered entirely satisfactory. It is, however, with regard to flatness image that requirements in the case of reproduction objectives are most exactin because every curvature in the image manifests itself on the finely grained plat in the form of indistinctness

Added to this, the photographer engaged in reproduction alone can ava himself of the faculty of producing "strictly flat" images. For when we speal of "strict flatness of image" in connection with an objective, it is tacitl understood that the object to be photographed is likewise strictly flat; an this is a condition which is generally met in reproduction processes alone, wher paintings, drawings, plans, etc., are reduced or enlarged.

The universal objective, on the other hand, is used for photographing land scape scenery, buildings, and persons, all of these objects having a certai depth. Of objects of this nature no objective can ever produce a strictly fla image, be its field of image ever so "flat" The image must rather in all instance be a representation of the object in relief, to which the sensitive surface would have to adapt itself, if the image produced on it were to be strictly sharp at every point.

Practical considerations, however, allow of the use of none but flat plates, hence *strict* flatness of field in a universal objective is an illusion There need, therefore, be no hesitation about admitting slight curvature of the field at the gain of an extension of the available area of the image—the angle of the image—to an angle of from 50° to 60° with very rapid, and to one of from 90° to 100° with less brilliant objectives

3. Freedom from Distortion.

In the matter of freedom from distortion the reproduction objective is generally more exacting than the universal objective, the former being required to define, with absolute accuracy, maps and plans as well as to reproduce scales and rules That requirement is fully met by any good reproduction objective. It should however, be remarked that there are also good universal and wide-angle objectives which are sufficiently free of distortion throughout the full extent of their large fields to be available even for photogrammetrical purposes. Thus, for instance, Dr C Pulfrich made successful use of a Tessar, rel Ap. 1 6 3 and f=180 mm., for 13×18 cm views, and Baron A von Hubl* applied a Protar 1 18, f=240 mm to 18×24 cm. plates for photogrammetrical surveying purposes.

* See "Mitteil des Militärgeograph Institute," Vienna, 1900, Vol XIX, p 85

4. The Elimination of Chromatic Aberrations.

The elimination of the defect commonly described as "focal difference" has rarely caused any difficulty since the Jena Glass Works of Schott & Genossen have placed at our disposal a large variety of splendid optical glasses. Appropriate utilization of these materials will, as a rule, enable the originator of the objective to so arrange that the image projected by the optically most effective yellow rays demands the same extension as the image produced by the photographically most effective violet rays. Thus, so far as these two colours are concerned, "focal difference" does simply not exist. However, the other colours of the spectrum, which also contribute to the formation of the photographic image, call for a slightly different length of extension, *viz.*, the green and blue rays require a shorter, the red and ultra-violet a longer extension than the yellow and violet rays. This digression from the ideal condition is called "the secondary spectrum." That now manifests itself in indistinctness on the plate which, however, is too slight to be even noticeable in amateur productions, but may, in reproduction work, be sufficiently pronounced to affect sharpness as to line details. Hence it is necessary to reduce the secondary spectrum in reproduction objectives to a sufficient degree to render it innocuous. This can be successfully accomplished in only a few types of objectives, by the employment of costly glasses, having certain characteristic properties. These glasses, again, are made in the Jena Glass Works. The term "Apochromat Objective" seems likely to acquire recognition as the established descriptive designation for photographic objectives with reduced secondary spectrum.

Another advantage, that namely, that the images produced by the different colours are of exactly equal dimension, usually goes hand in hand with the reduction of the secondary spectrum in this type of objectives. This point merits special prominence, inasmuch as freedom from focal difference in the ordinary sense by no means implies exactly corresponding size in the images produced by the yellow and the violet rays, notwithstanding that both may demand equal length of extension.

5. Variation of Sharpness according to the Scale of Reproduction

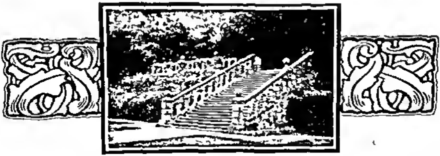
There remains to mention yet another difference between a universal and a reproduction objective The working capacity of nearly every objective, as displayed in sharpness of image, freedom from distortion, etc., depends in some measure on the scale of reproduction, and the originator of the objective generally has at hand the means of developing the highest degree of efficiency in regard to either very considerable reductions or reproductions in natural size. He will naturally pursue the former object in the case of the universal objective which, in the great majority of cases, will be applied to photographing distant objects, *i.e.*, considerable reduction, while with an objective required for reproduction his principal aim will be directed to attain the correction best calculated for slight enlargements or reductions, or specifically the best correction for reproduction in natural size, according to the main purpose intended.

If the objective be intended for three-colour photography, the most perfect possible chromatic correction naturally takes first rank. Here freedom from focal difference in the ordinarily accepted sense of the term alone is not sufficient, the foremost requirement being the extinction, as far as possible, of the secondary

spectrum, for thus only a sharp image under identical conditions of focal adjustment is obtainable with the red, the green and the blue light-filters. It is, furthermore, requisite that the three partial images be exactly similar in dimension otherwise coloured outlines in the positive will be produced in the course of superposing the three partial images.

The other directions in which "Apochromat Objectives" designed for colour photography should develop the highest capacity, depends on the various branches of application. If the objective is intended for three-colour photography from nature, the principles ruling in the correction of universal objectives will be the guide, *i.e.*, importance will centre in great rapidity and a large image angle, and efforts will be made to attain the utmost capacity for the definition of distant objects. These principles have been kept in view, for instance, in the recent construction of the Zeiss "Apochromat Planar" of Series IA., which has a maximum available aperture of 1 : 6 3, and embraces an angle of from 55° to 65°. It may, irrespective of its superior chromatic correction, take place side by side with the universal objective, Tessar 1 : 6 3

If, on the other hand, the objective is to be used for three-colour printing, extreme precision and flatness of image should be combined with the apochromatic correction of chromatic aberrations, particularly for the purpose of reproduction in natural size These requirements are met by, *for instance*, the Zeiss Reproduction Objectives of Series VIII., namely, the Planars and Tessars with reduced secondary spectrum, which have an available aperture of from $\frac{1}{12}$ to $\frac{1}{15}$ of their focal length



THE TERRACE HADDON HALL

Block by
HOOD & CO., LTD

Photograph by
GEO. E. BROWN

"Avant le Bal."

The Cubhunters.

Colour Blocks and Electros by
Geo. Newnes Ltd

Illustration from
'The Captain'

ELECTROTYPING OF THREE-COLOUR BLOCKS.

By J. S. SUNDERLAND,

Manager Electrotyping and Photo-Engraving Departments of Geo Newnes, Ltd

WANT A LIGHT

Block by THE MEISENBACH CO LTD   Photograph by THOS FALL

THERE appear to be many doubts as to the feasibility of being able to reproduce, by electrotyping methods, good three-colour blocks. This should not be the case, as a large number of books have recently been printed (more especially in London) from electros, the results being in every way satisfactory. There is only one proviso: that is, the electro must be of first-class quality, made either by the gutta-percha method, or special care adopted with the wax system.

It is owing to three-colour blocks often having exceedingly fine needle-like points in high-lights, that some electrotypers are not always as successful as could be desired. The fine points in the original plate often being of a ragged nature, it requires treatment that makes the possibility of filling up the space in the mould next to impossible.

The following is a simple way to overcome this difficulty, although few electrotypers, up to the present, have hit upon the method.

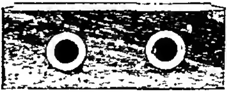
The plan adopted after the mould is taken from the block, is to make certain that no brush is allowed to come in contact with the moulded surface. It will be at once seen that by so doing, filling in the spaces occupied by the fine points with blacklead is an impossibility.

Many electrotypers will no doubt consider this statement absurd, and will ask, "how is the conducting surface of the mould produced?"

It will be found, however, that if suitable blacklead is used for *polishing* the wax surface before moulding—polishing in reality is meant in this instance—and not placing a quantity of graphite on the surface of the warm wax; just pushing it aside with a brush leaving a coating of blacklead that produces a dull looking surface, which on reproduction gives a grey instead of black in solids

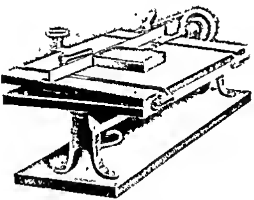
Only a small portion of blacklead should be applied to the warm wax before moulding. This gives a brightness to the surface of the mould, being very similar to the original. (The graphite to be recommended for this purpose is Dixon's polishing 049, and Morgan's, in equal proportions). It is now necessary to cover the wax mould with a sheet of paper or card while trimming, and only

with, and instead, holes of about a quarter of an inch in diameter are drilled through the wooden mount parallel to the surface and across the grain of the wood. Into these holes are forced tubes of cold-drawn steel, with the gratifying result, that the warping or cracking is prevented.



The manifold advantages accruing from this simple but unique invention are at once apparent to fine art and book printers, or indeed, to any who work with half-tone blocks, as not only are results far more satisfactory, but the time saved in making-ready, packing, etc., is considerable.

The machine which is required for carrying out the "Carl Norman Mounting System" is essentially a lathe bed and head stock carrying a special form of twist drill, and a bed for resting the blocks upon. The bed is provided with an adjustable fence for guiding the block, and there is also an adjusting screw for raising and lowering the top so as to centre the hole. The latter movement is important because it enables a wide block to be dealt with, by first boring half-way, and then turning the block over to bore from the other side and meet the first hole. In this way, blocks up to 10 inches or 12 inches wide can be bored, whilst for wider blocks, such as would require a clamped board, it is possible to bore through several narrow widths and thread them on to the steel tube, inserting two or more steel tubes, according to the size of the block. The tube is of a specially smooth and light character, and adds very little to the cost of the block. The tube is easily cut with a hack saw. The machine can be driven by means of a gut band from any convenient source of power or a stand with fly-wheel and treadle can be furnished, and any intelligent boy could be put to work it.



The additional cost to the customer is only a few pence, which is nothing compared to the appreciation of printers, who prefer the new method to the old, on account of the great saving of time and material. The new process has been fully tested, having been in use for some two years in the photo engraving works of the Photochrom Company, at Tunbridge Wells, and all blocks beyond a certain size are treated by this means, to the great satisfaction of the firm's customers. Messrs Penrose & Co. will be pleased to quote terms, and to show the machine in operation in their show-room.

E F GRUN Photogravit — SWAIN S Sculpit

THE "EARL AND THE GIRL"

THE first and sole photograph ever taken of a theatrical representation in colour by direct Three colour Photography Photographed with the Grun Liquid Lens and by ordinary stage lighting, with an exposure of 45 seconds

Taken by Edw F Grun, L R C P, Lond and by permission of Mr. Greet, at the Lyric Theatre, London, Oct 5th, 1904, with the kind assistance of Mr. Royce, Mr Walter Evett, Miss Louie Pounds, and the Members of Mr Greet's Company of the "Earl and the Girl

plate, and therefore it is necessary, in order to get the best results, that they be adjusted to the plates with which they are to be used. This explains why colour sensitive plates, when tested with light filters which have been adjusted to different brands of plates, give unsatisfactory results. The fault really lies with the light filters, which, though they may give good results with those plates to which they are adjusted, cannot be expected to give equally good results on plates possessing different curves of sensitiveness to the spectrum.

It is as reasonable to expect that one person's spectacles will suitably correct another's eyesight as to expect to obtain true colour records upon any kind of plates when they are used with light filters which have not been adjusted to them, but possibly are intended for use with an altogether different brand of plate.

Considering the problem when thus narrowed down to be one of negatives (plates) and positives (inks), it is my opinion that ultimately the present conception of theoretical perfect inks will be abandoned as incorrect, for the reason that the inks as at present advocated are not actually complementary to the colour records, as is supposed to be the case, for the positive is not a perfect (colour) transcript of the negative; there is an overlap of colour and consequently degradation. This fact is apparent in the absorption curves given in proof of the accuracy of the theory.

The writer attempted to prove the truth of this assertion in a lengthy paper published in "Photography," May 22nd, 1902, page 354, entitled "The Ideal Inks for Three-colour Photography," which may be consulted by those who are interested in the subject, for the writer still considers his views as stated therein to be correct, and they have not as yet been proved wrong.

Though it is always desirable to know the theoretical requirements of any process, difficulties arise in practice which prevent the realization of ideal conditions, and, bearing this in mind, I think it would be advisable for the process worker to supply the printer with the most suitable inks for use with his blocks. If this were the custom it ought then to be easy to adjust a set of plates, filters and inks which would give reasonably perfect results with less wastage than at present obtainable.

In adjusting such a set of materials I venture to suggest that the usual procedure be reversed, and the following method adopted.—

A set of standard three-colour inks would first be selected possessing as near as was practicable the ideal conditions as laid down in the article previously mentioned From these inks a colour sensitometer would have to be devised or adapted from one of the methods described by Sir W Abney, by the use of which it should be possible to adjust a set of light filters to suitable plates, the use of which would enable reproductions in colour to be obtained more accurately and with greater certainty than by the methods at present in vogue. But it is essential that the inks be supplied to the printer together with the process blocks

"MAKING READY": A PRINTER'S LITTLE WORRY.

By ARTHUR COX.

A BYGONE MELODY

Block by A. E. DENT & CO. Photograph by CATHERINE EDMONDS

PRINTERS are always complaining of the time occupied in making ready half-tones, and no doubt there is some reason for their complaint; undoubtedly there is an enormous amount of time wasted over this particular operation in many houses where half-tone blocks are used.

Why this state of things should exist is, to anyone who really understands the methods of half-tone printing a mystery. The operation of making ready blocks, which are properly mounted and interlayed, is so simple, and so expeditious, that one cannot understand where a printer can go wrong and waste so much time over the operation, as from all accounts they do.

It was not so long ago that I was looking at an impression of an eight-page forme, all blocks, square blocks about 8×6 in size, no type; the printer told me that his man had spent twelve hours in obtaining the result he then showed me; "twelve hours!" mind you, and the run was 1000, just fancy twelve hours making ready for $1\frac{1}{4}$ hours' run. I suggested to him that the time was altogether excessive, and he agreed that he thought it was rather a lot, but his man told him it was necessary and he believed it, because, as the printer remarked, "the man is a very good one and knows his business, and he tells me that no matter what the engravers say about perfect mounting of blocks, they do not save time." I suggested that one hour was ample time in which to obtain a much better result than theirs, knowing what I did of the blocks they had to work with. The result was that the matter was gone thoroughly into, and I'll cite for you the result: First of all we will take the machine on which they had tried to print. It was an out-of-date cylinder (all right, no doubt, for average type formes), the bearers were of wood and most uneven, the cylinder was not down on them (perhaps a good thing), they adjusted pressure by raising or lowering the cylinder, which, of course, is fatal to any machine; the cylinder bearings had a perceptible play in them, the rollers were not properly adjusted and simply

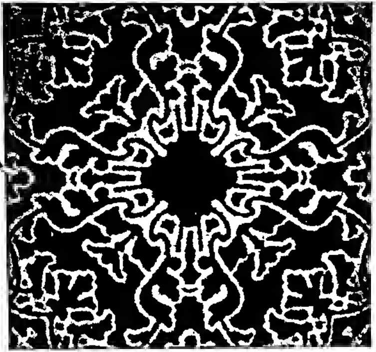
bumped over the forme, instead of just nicely touching the surface of the blocks; they were all in a most dilapidated condition as to rule cuts, etc. This gives an idea of the machine on which this enlightened firm of printers expected to compete with the times.

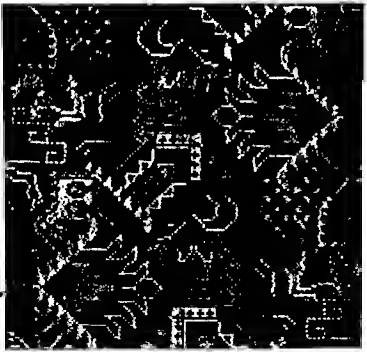
Now as to the system the man had used for making ready. His cylinder was packed with about fourteen sheets of cap paper and a thin card, the thin card against the cylinder; mind you, his cylinder was not on the bearers, therefore he had to pack up thick to get an impression at all; he called this packing "hard packing," naively remarking that he had read that hard packing was best for half-tone printing. Therefore, he commences operations with the printing surface of his cylinder too large for the bed, causing a race, or skid on the surface of his forme, wearing out blocks, type, etc., in the best possible manner. So much for the machine ready to commence. Now we will see what he does with his blocks before he puts them on the machine. He carefully, with the aid of an old turnscrew and a hammer, wrenches each plate off its mount, bending, more or less, each plate in the operation, then he removes the interlay he finds there, telling his boss that "that sort of thing's no good, he must cut his own;" he then proceeds to cut it, what we found he had cut, was two elaborate interlays, one on thin paper and one on paper a little thicker; the detail he had cut out was amazing and absolutely useless, so minute were many of the lights he had cut out. The resulting effect however in actual work would be as near as possible equal to the interlay he had removed, but he had wasted all that time, and the plate, when remounted, was so fearfully uneven, owing to the manner in which it had been bent in getting off the wood, that the subsequent process of making ready to get a really good impression was an almost impossible task. The system of make ready be used was cutting overlays out of cap and tissue paper and pasting on the top sheet of his packing. There is not much doubt that the man had not been idling his time away; he must have been very busy to carry out all these various fiddling, useless operations in the time; in fact, I should rather think he had been longer even than twelve hours, but didn't care to show it on his time sheet.

When one sees such machines and such methods in use for half-tone printing, is it strange that one hears such tales about the time occupied in making ready half-tone blocks? The actual time that should have been necessary to obtain a perfect result off the forme in question, should not have exceeded one hour at the very outside, that is, of course, providing that a good machine, or a machine in good condition had been used, and the cylinder properly packed. The blocks did not require touching, as I afterwards proved to them, and the method for making ready was wrong.

This little incident is merely one of many, and goes to show how printers go astray, waste time and obtain no good results. There are, of course, many printers in the country who do know how to handle half-tone work in a proper manner, but, on the other hand, there is to-day a big majority, and among the number big firms to my knowledge, who work on the wrong lines entirely.

It is purely a matter of education in this particular branch of the business, and if those printers who find such a lot of time being spent over this process of making ready would only bestir themselves and sift the matter to the bottom, they would find plenty of chances of being put on the right methods.





VIERFARBEN-ÄTZUNG von DR. E. ALBERT & Co.
GEDRUCKT VON „ALBERT-GALVANOS".

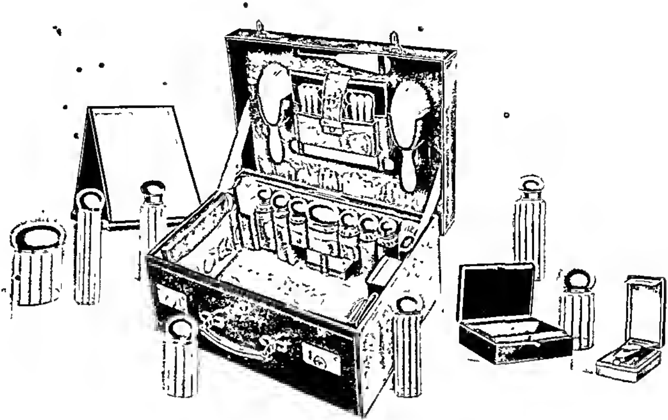
Catalogue Illustration.

Original Retouched by
Kleboe & Franel

Japanese Curios.

Block by
W. & G. Baird, Ltd.

By permission of
Messrs. Young & Swanson, Belfast.



Commercial Illustration.

Block by
Bourne & Co

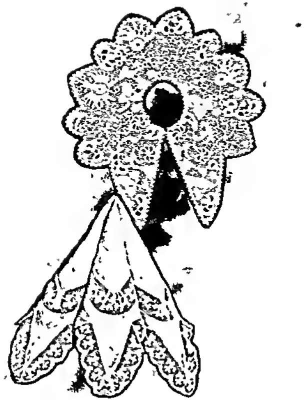
A Dainty Corset.

Block by
The [illegible] Co. Ltd

A Fashion Design.

Block by
Ashworth & Meredith

Sketch kindly lent by
Alabaster, Passmore & Sons



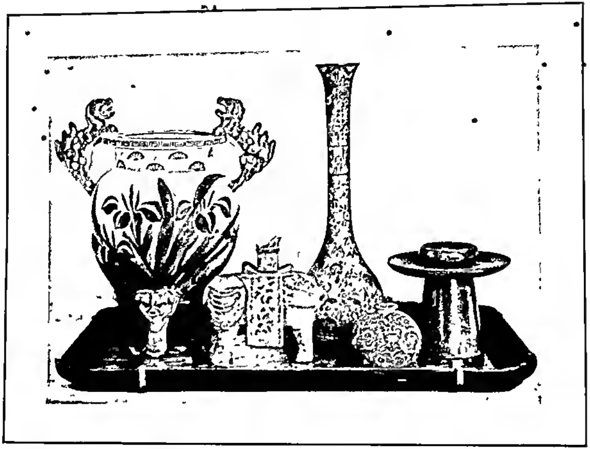
Lace.

lock by
' A G Baird Ltd

Lent by
Messrs. Murphy & Orr Ltd
Belfast.

Silver Ware.

Block by
Press Etching Co



Rare Vases.

Direct Reproductions from Nature

Three Colour Blocks by
W. & G Baird Ltd

Lent by
Messrs Young & Swanston Belfast

SOME RECENT DEVELOPMENTS IN DUPLICATE PLATE MAKING.

By J. A. COREY,

Manager, Electrotyping Department of His Majesty's Printing Office

DON'T CARE

Block by BURSILL & LADYMAN — Photograph by J. E. GOOLD

THERE have been no startling discoveries recently, nor radical departures from old-established principles and methods in duplicate plate making—at least there is nothing of this nature yet generally adopted or admitted.

Rather has there been a gradual improvement along old lines—a perfecting of details here and there—all tending to a quicker, cheaper or better product.

Some of the more recent instances that I may mention are Improved Hydraulic and Power-Toggle Moulding Presses, Mortising (or piercing), Correcting and Black-Leading Machines and Depositing Apparatus.

Nearly all the improvements of recent years have benefited the printer more than the plate maker. The printer's gain has been in quality of plates, lessened cost, or quicker service—sometimes all three—while the plate maker's difficulties have not been materially lessened.

The greatest need of the electrotyping business to-day is a better moulding medium; and when I say *better* medium, I mean some substance that will give, even when rapidly used, uniformly good results under positive conditions easily determined and maintained, so that we shall not be so completely at the mercy of the judgment of one man (the moulder). This, to my mind, is of vastly more importance than the discarding of black-lead (graphite).

For every other important stage in the making of an electrotype we have positive, determined rules, while the actual moulding—*on which the success of the work depends*—is still largely a rule of thumb matter.

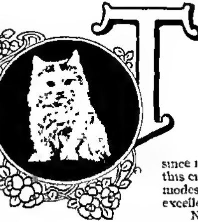
Get rid of the uncertainties of moulding, and the extreme liability of the mould to damage, and the electrotyper's life will be comparatively a happy one.

We have heard not a little of Dr. Albert's Patented Process of Moulding in sheet lead, but as yet have no proof of its practicability. If all that is claimed for it proves true, it will be one of, if not *the* greatest of, advances ever made in the art. Not only would it do away with "black-lead," which many electrotypers have been striving for years past to eliminate, but it would enable us to dispense with considerable costly machinery and apparatus. It would also

PROCESS OF TRICHROMATIC PHOTOGRAPHY BY THE CARBON PROCESS.

By LÉON VIDAL.

(TRANSLATED BY THE EDITOR.)



PUFF

...k by ...ILL & LADYMAN — Photograph by A J THORNE

THERE are divers ways of applying the trichromatic process, some more especially industrial, and others better within the reach of amateurs, who only pretend to the easy execution of a limited number of prints. Among these latter the carbon process seems to be one in which the manipulation is most easily adapted to the conditions of operating with preparations of colours of suitable kinds.

The employment of bichromated gelatine and of appropriate dyes may equally be considered, since it is adapted to amateur work, and on account of this circumstance it is well to choose between these two modes of operation, each susceptible of leading to excellent results.

Nevertheless, for prints of large dimensions we prefer the carbon process, reserving the dyed prints for transparencies for projection and for the stereoscope.

Though the ordinary carbon process is well known, it is necessary to study it specially and indicate its adaptation to the obtaining of polychromatic impressions by the method of superposition in a sufficiently sure way.

The important point consists in the employment on paper of mixtures possessing the qualities requisite for the three colours, yellow, red and blue, all being prepared with gelatine.

Generally these mixed papers are supplied all ready, and it would be too complicated for an amateur to grind up the colours himself, mix them with the gelatine, and coat the sheets of paper.

Unfortunately, the limited number of those persons making polychromatic prints and the few students, has caused makers of such mixtures and pigments to be slow in specially perfecting materials appropriate for trichromy, one may nevertheless find it possible to procure such papers, and for our part we have been able to obtain with such papers from various French sources the most beautiful prints. Doubtless one is not yet able to procure good preparations of this sort in England, Germany, etc.

Without insisting on the necessity of using the essential three colours distinctly characterised by their spectral hues, red, yellow and blue, which by their

combination from all the colours of nature it is still proper to verify whether the coatings of the colour mixtures are of sufficient thickness, it frequently happens that with the yellow mixture easily traversed by the light throughout its thickness, one is not able to separate the first support from the second when transferring the image with the view to development.

A COUNTRY SMITHY

Design and Block by LASCELLES & Co., LTD. Photograph by H. C. LEAT

For obviating this inconvenience M. Vaucamps has the idea of interposing between the mixed colours and the paper a substance insoluble in lukewarm water, but inert in relation to the gelatine and to the bichromate. This precaution would be unnecessary if the film was sufficiently thick, or if the negatives employed for the printing did not prevent by their contrasts too many washings.

With the reservations we have indicated, let us proceed with the process, and describe it succinctly, assuming we have disposed of the question of obtaining suitable material

The first operation to be done is to mark the direction of the stripes of colour on the back in one of the two senses, either length or breadth, and to always place the pieces of paper the same way, in the sensitizing, and in the exposure to light. This condition is essential to good registration.

The standard of the sensitizing bath is variable according to the nature of the negatives and the season.

After remaining in the bath of bichromate for about four minutes one applies each piece of paper to a properly prepared glass and passes over the back a squeegee to force out the liquid in excess. This done the sheet is placed, paper side down, on a glass plate of a little larger size, and the edges fixed all round with starch paste, to let the coated paper take a state of maximum distention.

When it is dry the paper may be used immediately, but it is convenient to take it off its support by cutting it all round with the point of a knife at the moment one is ready to place it in the printing frame.

The effect of the exposure may not be appreciable on the blue colour, but with a little practice one judges very well the degree of the impression on the yellow and red where the action of the light is made visible by a brown colouration. For the blue we employ an actinometer in which is placed a fragment of sensitive paper. One exposes in this case with the aid of a spring, a small part of the negative, say where the half-tones are the most intense.

DEVELOPMENT.—This operation is done on glass plates destined to serve as a provisional support, the edges being varnished with india-rubber, and collodionized. The plain collodion used for this purpose is $1\frac{1}{2}$ to 2 per cent. The development should not be undertaken until the collodion is perfectly dry. The colour print is introduced into a bath of cold water, the collodionized glass with the collodion side uppermost is immersed for a few minutes, and then taken out with the colour print adhering to it, and a squeegee is passed over it after covering the print with blotting paper, then leaving it under a weight for about

lessen the time of production considerably—principally in the depositing. The matrix, being metal, the temperature of the solution could be raised so as to allow a current density to be employed, double that permissible with wax matrices (or moulds). All this means that we should then be able to produce an electrotype with a good, substantial shell in about the same time now required to make a good stereo.

L'Echo

Block by H. Rheinlander & Co — Photograph by City Art Photographic Co

Just about a year ago, the writer had the good fortune to be shown something of this process by Dr. Albert, at his works in Munich. My hopes that the perfect matrix had at last arrived were, however, somewhat shaken, after mature reflection. Still, I hope that the Doctor's claims may be fully realized.

Some three years ago, Mr. Ivor Lewis and myself commenced experiments in copper depositing for printing plates, on somewhat new lines. Our investigations were based on principles well-known in laboratory practice, but, as far as I am aware, hitherto untried for the practical production of printing plates. The early results obtained decided us to have built an apparatus to be used under ordinary workshop conditions, and this has been in daily use for the past eighteen months. It has been improved and modified in some respects, so that now the results are quite satisfactory. I do not think, however, that the limit of this particular form of depositor has by any means been reached. Perhaps it would be interesting and instructive to here say a few words about the best achievement heretofore attained by any depositing device generally known to the trade.

H. R. Boissier, of New York, brought out in 1900 a device which beat anything in use up to that time. My firm purchased the third machine built and this was the first to go abroad. As sent out, one could employ a current density of 100 amps per square foot, or nearly double that permissible in a quiescent solution, and obtain a perfect shell. By making some slight changes in the one under my control, I have been able to work with 125 amps. per square foot and obtain an equally good quality of copper.

The best result so far obtained with the Corey-Lewis apparatus is illustrated by the following example.

Working at 100° Fahrenheit, we successfully employ 220 amps. per square foot. It may be set out thus —

100° Fahrenheit 31·5 amps. per volt per square foot with cathode and anode about 4 inches apart.

This result was obtained in a thoroughly practical manner. By "practical," I mean that *no more time* was taken in preparing the mould for the bath than would have been necessary if it were to have gone into a still bath. There was no extra risk of damage nor extra work or time required from the taking of the mould to the "backing-up" of the "shell."

We hope soon to be able to give to the trade full particulars of this depositor.

So much for the electrotyping part of the business. In the stereotyping branch there has also been some recent progress, both in machines and "flongs." Of the many "flongs" brought out during the last two or three years, one made by Mr. T. J. Kelly (of Cassell's) I consider quite the best for all-round purposes. Everybody connected with newspaper work has, I think, heard all about the Autoplate Machine long before this, so I will simply say, for the benefit of any who have not, that this machine casts and finishes news plates at the rate of three per minute. With two attendants—one to watch the machine and change the matrices, the other to take away the plates—it does the work perfectly.

Then there is the Hopkins Machine, which casts at about the same rate and was designed to sell at about half the price of the Autoplate. The future of the Hopkins Machine is problematical, for the reason that it is tied up in patent litigation, the owners of the Autoplate Patents having entered interference proceedings and stopped its sale.

In connection with the stereotyping branch there is little else I can think of that is worth recording.

Mr George Dunton, in summing up his optimistic article on "The Future of Electrotyping"—which appeared in the last PROCESS YEAR BOOK—sounded the right note in pointing to the necessity or desirability of a combining of the ingenious efforts of the plate maker and machine builder for the one aim, namely:—quicker production by the further elimination of hand-work

I must own, though, that members of the electrotyping and stereotyping fraternity seem to be peculiarly lacking in inventive ability—or, at least, in inventive activity; and I regret to record my belief that if there is ever discovered, or devised, any great, revolutionary improvement in the art of electrotyping it will be by someone outside of the trade.

SHUT OUT

Block by
H. RHEINLANDER & CO

Photograph by
H. A. GEORGE

6 to 10 minutes. After this one puts the plate in a bath containing water at 40° Centigrade, the colour paper upwards. Briefly, one must get into the way of knowing when the image is developed and all the soluble composition has been washed away. The print is then rinsed properly with water and immersed in alcohol of 92°, where it hardens. We may then coat it with a film of 5 per cent. gelatine and let it dry in a place free from dust.

When the three monochromes have been each obtained there is nothing more to do than to mount the prints to form the composite trichromatic image.

For the mounting one takes a good paper coated on one side only, and introduces it into a bath containing a solution of gelatine at 5 per cent., with the print on its provisional support, bringing the two against each other and drawing them out together; then passing a squeegee over the back of the paper and letting it dry.

After the drying of this first proof, which usually is yellow, one does the same with the second, which is the blue. If the operations above described have been done in the way indicated the registration will be perfect. The register is obtained by making the blue print slide over the yellow whilst the gelatine is in a liquid state, which permits the print to be slipped about easily. When a perfectly complete registration is obtained, a squeegee is passed over the print, and then it is allowed to dry.

For the last image to be superimposed one operates in the same way, and achieves finally the trichromatic result. There is nothing more to do than to mount on a rather thick card, and to carefully retouch it if need be, when it is entirely finished

The question above all others is in relation to making the registration as exact as possible. That is why it is necessary to attend scrupulously to the directions given above

One may imagine a variation of the process, which consists of preparing sheets of celluloid with the mixed colours. In this case we print through the thickness of the transparent support and thereby dispense with the double transfer. The Neue Photographische Gesellschaft, of Berlin-Steglitz, prepares and sells these coloured films under the name of "Pigment Folien fur Dreifarben Photographie."

It goes without saying that the sheet of celluloid is not intended as a temporary support which is easily abandoned when the successive transfers have been made, but as a final support.

There is a case where we may employ these transparent sheets to render a great service. This is that instead of insisting on the advantage which is secured of avoiding the necessity of developing after a first transfer. The tearing is not so much to be feared since the development is done directly on the first support aft& the exposure, considering the thickness (about 1-10 mm.) of the celluloid.

Until we have found the means for example, in a way such as that indicated by Dr. Koenig, the pigmentary basis, with the sensibility to light of the bichromated gelatine is still the most convenient for the amateur desiring to make prints of the dimensions of 9×12 cm (4¾×3½ in.) or even larger

The process of Dr. Koenig rests on the direct coloration of certain compositions, named leuco-bases, in the presence of light, the image being formed in red, blue and yellow The action may be stopped when judged to be sufficient, and the other two colours can by means of printing be immediately superimposed on the first.

We may demand whether this process yields real advantages; it is, nevertheless, curious and interesting, but it remains to be seen whether it will come into practice

THE FUTURE OF THREE-COLOUR WORK.

By Prof. Dr. Aarland.

(Translated by the Editor.)

The End of the Story

Block by Bursill & Ladyman — Photograph by David Blount

THE three-colour print, which now for a series of years has been gradually employed in various ways for illustrative work of every kind, is still in a stage where further improvement is needed. It may well become a question whether the insufficiency of the process, through the length of time necessary for the production of the printing plates, and the fact that the cost of printing is still actually very costly, may not induce a return to monochrome representation. It is sufficiently well known that of all the work which the different three-colour studios turn out only a relatively small percentage can be regarded as good.

Many advanced artists and art scholars will not have anything to do with coloured reproductions of art subjects by the three-colour process, because the results do not meet their requirements. Even so is it with the representations of coloured scientific objects by means of the three-colour process. For this work it is still not at all applicable. For representing the finest details of the delicate differences of colour which one observes in the action of polarised light, and with spectrum experiments, etc., the present three-colour process is much too crude, and in its handling quite unfit. Consequently all authors are afraid on these grounds of a coloured picture, and restrict themselves to single colour prints. These are difficult considerations for the future of the three-colour print upon which on all sides the greatest hope is fixed. The three-colour print will always be of a certain importance for every-day work, but in this case only if practised by really skilful workers.

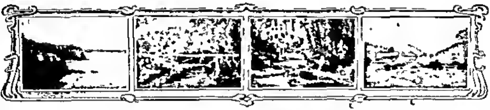
We have promised ourselves a great deal from the new sensitizers and, if one judges them according to the spectroscopic results, they show decidedly great advantages in relation to these aims compared with the dyes formerly employed. Above all the high red sensitiveness of Pinochrome and Katachrome has been

prominently shown. It is, however, a pity that with all the good qualities of the new dyes very little remains utilized, when one sensitizes these with plates which are employed for the taking of subjects by reflected light, also for paintings, nature studies, etc. Here all the new dyes from Ethyl Red to Katachrome are equal to each other, that is to say, the red sensitiveness is quite a minimum. If one takes, under equal conditions, a colour chart with plates sensitized with the different new dyes, the negatives are scarcely to be distinguished from one another

The light filters have been in many ways altered. If one but considers that almost every author puts forward particular colour filters for his sensitizing method, so that filters in all colour gradations are on the market, and that they attempt to back up their choice by learned treatises, one can hardly help smiling. One sees how much self-adulation these gentlemen introduce, and how little knowledge there exists regarding practical requirements. All these high-sounding advertisements amount to nothing, when we observe how pitifully alike are the results obtained with the different sensitizers for three-colour work when applied to actual practice. Let it be well understood that I am only referring to such efforts, and not to scientific spectroscopic work, where entirely different conditions predominate.

No real progress in practical three-colour work is noticeable, and with regard to the purely technical side (the production of printing plates, printing inks, papers, etc.), no really new achievements have been made. The old methods are still generally in use, *e g*, the gradual stopping out and fine etching to obtain the colours of the original. How far the result is successful depends entirely on the skill and the artistic training of the staff entrusted with the work.

Perhaps the Schulze process of half-tone now in progress for three-colour work may bring improvements in this direction, and we hope to be able to show in the next Year Book such a three-colour print However, even if the Schulze process does not bring the hoped-for advantages, three-colour printing will expand in spite of its many shortcomings, provided it is worked within its limits.



Australian Bush Views

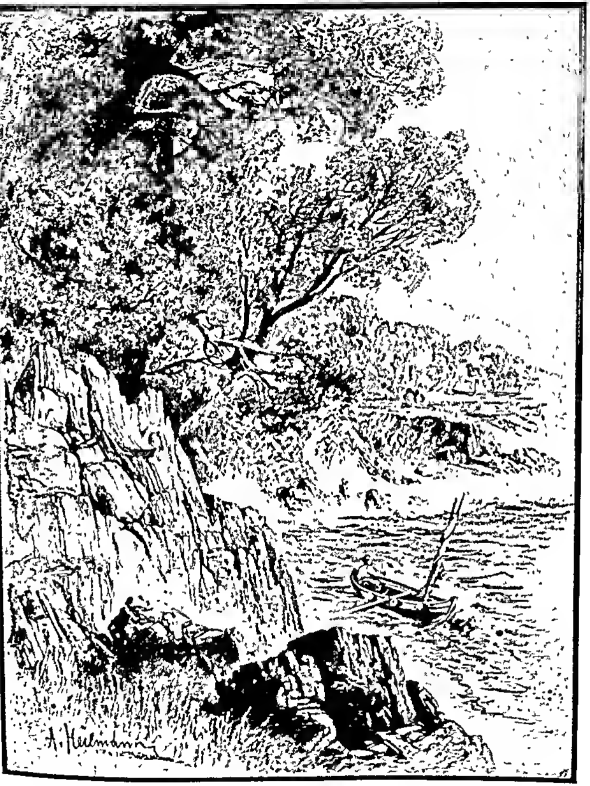
Block by
The Meisenbach Co Ltd.

Photographs by
Alex Hardie.

The Lithographer.

Three Colour Blocks by
De Reproductie Comp. Rotterdam

From a Water Colour Sketch by
W. Hoogenbos



A Craggy Shore.

Stipple Engraving with Metzograph Screen by
C. Angerer & Göschl, Vienna.

From a Drawing by
A. Heilmann.

From Saturday to Monday.

Block by
Dunn Engraving Co

Photograph by
H Goulton May

The South Australian Society of Arts' Exhibition, Adelaide, 1904.

Block by
The Critic Process Studios.
Adelaide S.A.

Photograph by
H Krischock Adelaide, S A

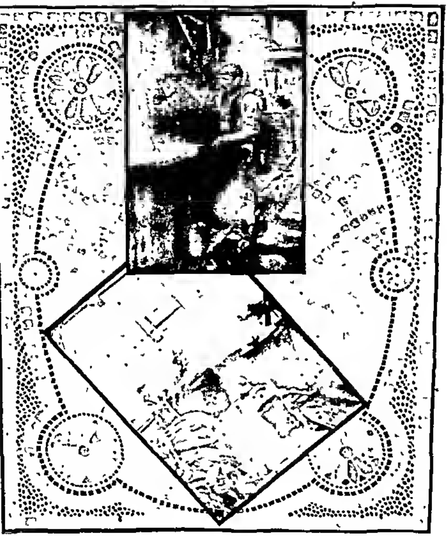
Jovial Old Age.

Half Tone Block by [illegible]
C. T. [illegible] Co. O. U.S.A.

See [illegible] with
[illegible] page

Jovial Old Age.

Engraving made by
C. T. Koch, Chicago, U. S. A.
with Wheeler's
Metrograph Coarse Grain Screen



The Dyehouse.

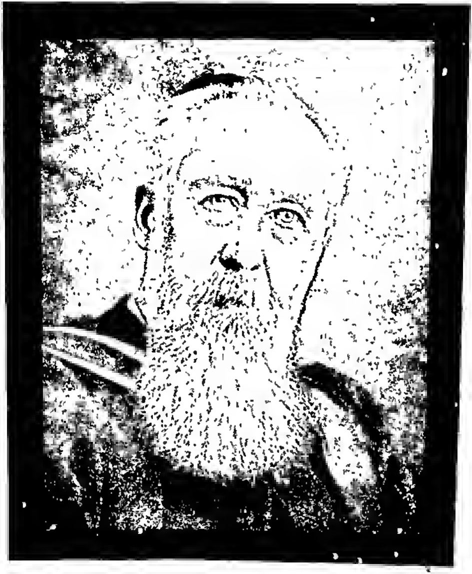
Blocks by
Blatchford Bros

Photographs by
H. Wilson Jun.

Highclere, from North-East.

Block by
Acme Engraving Co Ltd

Photograph by
F G O Stuart



The Rev. S. Kenah, M.A., R.N.

Metzograph Screen Block by
C. Angerer & Goschl

Photograph by
A. V. Kenah

RESULTS WITH THE METZOGRAPH SCREEN.

By A. J. NEWTON,

Principal, London County Council School of Photo-Engraving and Lithography

SEVERAL years the Metzograph screen has now been on the market and some firms are producing very good results by its aid, but the majority ignore it, perhaps not having tried it, or having tried it, decline to use either from not mastering its peculiarities, or because it does not give the same result as the ordinary cross-line screen. It is highly improbable that any grain screen will ever give the same faithful rendering of both gradation and detail that the cross-line will; on the other hand there are some cases in which the grain screen is positively superior, as for example, when there occur on the original, lines in circles or certain other directions, which cannot be reproduced by the cross-line screen without showing a pattern. And this indicates the greatest field of usefulness for the Metzograph screen, viz., in making one of the blocks for two, three, or four printing jobs It is quite impossible to avoid some pattern when two ordinary half-tones cross one another, although it is possible to minimise this so as to make it almost unnoticeable, by crossing each set of lines at an angle of 60 degrees to the other When three blocks, as in three-colour, or four blocks, as in four-colour, are printed on top of each other, the danger of pattern showing naturally becomes still more likely. In these cases it is always possible to make one or more of the blocks with the Metzograph instead of the ordinary screen. One of the largest and most successful of the firms producing four-colour work on the continent invariably use the Metzograph for the yellow printer in their four-colour work, and this enables the black to be printed without making their blocks appear to have any more pattern than the usual three-colour blocks Two out of the three blocks could be made by the Metzograph, but in my opinion, it is better at any rate to have the third (blue) printed from a half-tone to help the detail

For photogravure by the enamel process, the screen is invaluable, a grained transparency being made with it, the print made on fish glue on copper, this being enamelled and etched exactly as a relief block would be, except that the etching takes much less time. The result is exactly like a rather coarse-grained photogravure, and is very much easier to print by reason of its greater depth.

For photo-lithography, when a cross-line screen would be employed, the Metzograph can be substituted with advantage, enabling corrections to be made on the stone, zinc, or aluminium, with but little probability of their being apparent.

The screen is totally unlike a cross-line in appearance, looking like a piece of matted glass, yet in some respects its behaviour is similar, in as much that the farther away the screen is placed from the plate, the more the contrast (figs. 1 and 2), or if the screen be kept at the same distance, the larger the stop used the more the contrast (fig. 3). But the dissimilarity to the cross-line is obvious when one observes that the more the contrast, the coarser the screen

The Rev. S. Kenah, M.A., R.N.

Metzograph Screen Block by
C. Angerer & Goschl

Photograph by
A. V. Kenah

appears to be. This is also true if the contrast is secured by fine etching. Mr. Wheeler (himself the inventor and manufacturer of the screen) recommends that it should be placed as close as possible to the plate, and certainly this will secure the best detail and the least unpleasant grain, at the same time becoming more difficult for the printer, exactly like fine screen cross-line blocks.

Now with the usual form of screen carrier, the screen cannot be brought closer to the plate than one millimetre, but the screen can be got very near, if two indiarubber bands are placed round the latter at the top and bottom, and then it is placed in the dark slide and the plate rested against the indiarubber bands, or a mask can be cut out of very thin cardboard, and the wet plate rested on this. Of course, allowance must be made when focussing for the different plane the plate will occupy. Fig. 4 shows a block made from a negative in this way.

In making the negative a small stop should be used, say 1-100th of the camera extension. The use of white paper "flashing" during exposure is not necessary, except in the case of very severely contrasted originals, and the development is as usual, but if the negative is examined then with a magnifying glass, it will be found usually that the high-light is a little "bunged" and it is better therefore to reduce slightly with weak iodo-cyanide, or ferri-cyanide and hypo, before intensifying with copper bromide and silver.

The printing on to metal must be carefully done, a thin glue solution used, and the frame must not be placed too close to the arc, if artificial light is used.

The Metzograph screen can also be used for printing in contact with the metal, in the same way as the cross-line screen is used in Dr. Albert's "Citochrome" process, the light being first made parallel by means of a condenser, or Mr. Wheeler's printing box used in daylight.

The few rough examples herewith are not put forward as in any way showing the best the screen is capable of doing, but merely to illustrate the alteration in appearance of grain with different procedure. They are the work of Mr. Whitaker, a student of the School. One half of the original was covered with black velvet while the other half was exposing, the negatives were made all with the same screen without flashing, from a red-toned P.O.P. print, and needless to say there has been no fine etching on the blocks

NOTE.—The initial and tailpiece (both original designs and etchings) ornamenting this article are the work of the Students of the L.C.C. School of Photo-Engraving and Lithography

Fig 1

Fig 2

Fig 3

Fig 4

SEE ARTICLE "RESULTS WITH THE METZOGRAPH SCREEN."

appears to be. This is also true if the contrast is secured by fine etching. Mr. Wheeler (himself the inventor and manufacturer of the screen) recommends that it should be placed as close as possible to the plate, and certainly this will secure the best detail and the least unpleasant grain, at the same time becoming more difficult for the printer, exactly like fine screen cross-line blocks.

Now with the usual form of screen carrier, the screen cannot be brought closer to the plate than one millimetre, but the screen can be got very near, if two indiarubber bands are placed round the latter at the top and bottom, and then it is placed in the dark slide and the plate rested against the indiarubber bands, or a mask can be cut out of very thin cardboard, and the wet plate rested on this. Of course, allowance must be made when focussing for the different plane the plate will occupy. Fig. 4 shows a block made from a negative in this way.

In making the negative a small stop should be used, say 1–100th of the camera extension. The use of white paper "flashing" during exposure is not necessary, except in the case of very severely contrasted originals, and the development is as usual, but if the negative is examined then with a magnifying glass, it will be found usually that the high-light is a little "bunged" and it is better therefore to reduce slightly with weak iodo-cyanide, or ferri-cyanide and hypo, before intensifying with copper bromide and silver.

The printing on to metal must be carefully done, a thin glue solution used, and the frame must not be placed too close to the arc, if artificial light is used.

The Metzograph screen can also be used for printing in contact with the metal, in the same way as the cross-line screen is used in Dr. Albert's "Citochrome" process, the light being first made parallel by means of a condenser, or Mr. Wheeler's printing box used in daylight.

The few rough examples herewith are not put forward as in any way showing the best the screen is capable of doing, but merely to illustrate the alteration in appearance of grain with different procedure. They are the work of Mr. Whitaker, a student of the School. One half of the original was covered with black velvet while the other half was exposing, the negatives were made all with the same screen without flashing, from a red-toned P.O.P. print, and needless to say there has been no fine etching on the blocks.

NOTE.—The initial and tailpiece (both original designs and etchings) ornamenting this article are the work of the Students of the L.C.C. School of Photo-Engraving and Lithography

THE CAUSES INFLUENCING THE COLLOTYPE GRAIN.

By R. B. FISHENDEN,

Photography and Printing Crafts Department, Municipal School of Technology, Manchester

THE substance of this article is the result of a series of preliminary experiments, the object of which was to investigate the cause, or causes, of the production of grain in a collotype plate, and also the reasons for the variation in the character of such grain. As a rule, work in this direction has not been carried out in such a manner that effects resulting from any isolated condition could be detected. In the present instance the plates were prepared with various modifications as to formula, temperature of drying and thickness of gelatine coating, as detailed below. After exposing, washing-out and drying under uniform conditions, the "grain" of the plates was examined under the microscope. Proofs were afterwards taken on an "enamel" paper in order that as crisp copies as possible might be obtained, and these were also microscopically examined.

The drying box which has been used calls for special notice, in that it represents a departure from the usual form. The outer walls are constructed of wood, with an inner lining of zinc, having a packing of one inch thickness of slag wool between the two in order that the interior of the box may be maintained at a constant temperature The heating is by means of a steam coil, the steam being supplied at 60 lbs pressure, and by the use of a valve in conjunction with a steam trap the pressure may be regulated and any necessary temperature maintained throughout the drying operations. The internal volume of the box is large compared with the area available for drying, so that a considerable quantity of hot air may circulate diffusion takes place through a layer of serge, which occupies a portion of the top of the box at a greater distance than is usual from the plates, with the idea of avoiding the effect produced by draught. The temperature is taken at the level of the plates by means of a special thermometer, the scale of which is outside the box

The causes which influence the grain in collotype plates may be stated as follows —

1. The character of the gelatine
2. Thickness of the gelatine film
3. Temperature of drying box.
4. Length of time the plates are kept in a sensitive condition and the method of storing.
5. Proportion of alkaline bichromate present in relation to solid gelatine
6. Presence of calcium chloride or other substance in the gelatine preparation which may exert a similar influence on the gelatine.
7. Treatment of the plate after washing-out and previous to printing in the press

To consider these in detail:—

1. The hardness of gelatine for the purpose of collotype is of interest in a number of ways, but for the present we need only consider it in so far as it affects the water-absorbing capacity, the soft gelatine absorbing more water than the hard variety at a similar temperature. If two exposed collotype plates be placed in water for the purpose of removing the unaltered bichromates one having been made with a soft and the other with a hard gelatine, more swelling will take place, and a greater relief will be produced with the softer gelatine providing that the solutions from which the plates were prepared both contained a similar proportion of gelatine. The plate with the greater relief will be found, under the microscope, to possess the coarser grain.

2. The thickness of the gelatine film exercises an influence on the resulting grain, a thin film producing a finer grain than a thick one with gelatine of similar character, because the thicker film absorbs more water and so produces more relief, the effect corresponding to the previous cause mentioned.

We can only surmise the reasons why a greater relief produces a coarser grain, but if the insoluble gelatine resulting on the exposure to light be considered as a skin over the surface of the film with unaltered and still soluble gelatine underneath, it is conceivable that in swelling, the greater swelling capacity of the softer variety or a thicker coating of gelatine will result in a more marked reticulation or "puckering" of the insoluble skin; the skin is incapable of swelling, and has to be forced out of shape to allow for the expansion of the gelatine underneath, which swells when it absorbs water.

3. Bichromated gelatine becomes spontaneously insoluble if dried at too high a temperature, or if the drying be allowed to continue for a longer time than is requisite; the completely insoluble stage is arrived at gradually, so that if more heat is expended on the plates than is necessary for removing the moisture, the melting point of the gelatine will be higher, the capacity for absorbing water will be reduced and less swelling possible at any given temperature, until ultimately complete insolubility will be produced. The result will be similar to the two previous cases, where the swelling capacity was reduced, in other words, the tendency of a high temperature in the drying box is to produce a finer grain plate, other conditions being equal In conjunction with the finer grain there will be the drawbacks of a hard plate and, if carried to excess, flat, "muddy" proofs with dirty whites will result, because the gelatine has been rendered partially insoluble even where no light action has taken place.

4. Whilst in a sensitive condition, the plates must be stored in a dark chamber containing anhydrous calcium chloride or some other water absorbing substance. Storing the plates under ordinary conditions even in a dark place will quickly produce insolubility; bichromated gelatine rapidly becomes insoluble in a damp atmosphere, so that the plates should be transferred from the drying box to the calcium chamber as soon as they are dry, because the gelatine at that time does not contain as much moisture as it would do normally and will quickly attract moisture to itself from the air, and so tend to cause the insolubility, therefore, a slight exposure to moisture will make the plate harder than it was formerly, possessing similar characteristics to those mentioned in the previous case

5. The sensitiveness of the gelatine is governed by the quantity of the particular bichromate used in relation to the amount of gelatine. This is most conveniently expressed as a percentage of bichromate to solid gelatine. A normal formula contains about 17 per cent., and it is quite practicable to increase the amount of bichromate up to 25 per cent. with a good gelatine. Dr. Eder

states that some gelatines will hold as much as 40 per cent., but this is exceptional; if a solution is prepared containing a larger quantity of bichromate than the gelatine is capable of holding in solid solution, the salt will crystallize out on drying, and the plate will be rendered useless. Under similar conditions the preparation containing the largest percentage of bichromate produces the coarser grain.

The causes stated above influence the resulting grain in the manner indicated, but they may be better described as *tendencies*, because the differences are slight, and require careful examination to be observed; by the combination of two or more of these tendencies a more noticeable difference may be brought about, but even then it is not possible to obtain a grain of any particular character with certainty. The preparation of plates with the special idea of producing a definite coarse grain for transferring is a matter of some interest. It is possible to make plates which appear to be coarse by examination, but the coarseness will not print, the actual reticulation being finer than the apparent grain. The other two causes to be mentioned, used in conjunction with the foregoing, exert a remarkable influence in the production of a coarse grain.

6. The addition of such substances as calcium chloride, sodium chloride or potassium ferricyanide to the gelatine preparation is recommended in various published processes for the purpose of making coarse grain plates. In actual experiment the addition of 7 per cent. of calcium chloride to the weight of gelatine contained in the solution was found to exert a marked influence combined with the tendencies referred to above. It is possible that the calcium chloride, which is very hygroscopic, influences the rate of absorption of the water when a plate is "washed out" causing the gelatine containing it to swell very rapidly and break up the insoluble skin above it (which received the light action) into a grain of more definite character than would otherwise result.

7. A proof from this plate may show a coarse grain, but probably the grain will not be crisp. The grain may, however, be made more pronounced and, at the same time more lasting by special treatment of the film before printing in the press. The plate should be immersed for a short time in a weak solution of ammonia at about 40 C., which will cause excessive swelling, a softening of the gelatine and an opening of the grain. The plate after washing should be superficially hardened in a solution of chrome alum or other suitable hardening agent, and allowed to dry before placing in the press. If transfers are required, it is well to "etch" or damp the plate more than is usual before commencing the rolling up because the transfer ink will be found to produce rather a large amount of tinting in the whites by reason of the greasy nature of the transfer ink. The transfers should be taken as quickly as possible, because as printing proceeds the grain becomes less pronounced, and it cannot be revived with any great success.

By varying the amount of calcium chloride and modifying the after-treatment, the grain of the plates may be varied in size.

SOME POINTERS FROM A FAMOUS SUCCESS.

By F. COLEBROOK.

ORDINARILY, the "PROCESS YEAR BOOK," in its devotion to its learned profession, only knows advocates of processes of wet plates, dry plates, this enamelling, that enamelling. It knows no persons. For one thing, it couldn't know all process personalities in an editorial way. It couldn't introduce all the engravers to each other. But there can be only one house with the largest staff, and to that, perhaps, one may allude in any year. It may not be the same house every December. Often before now tortoises have "taught us," as "Alice in Wonderland" puts it. At times the hare is ahead; hares do *sometimes* beat tortoises after all, as we have read in an Æsop for printers. Whether derivable from hare or tortoise, the question is, what is there in the winner's story of any interest to us?

Some months ago, the *Inland Printer* of America (and of the World) wrote. "Specimens of three-colour work have come to us from Carl Hentschel, of London. The etching of the Hentschel plates is admirably done, as is the press work. One thing can be said with certainty. If the colour plate makers of the world could make colour plates like Carl Hentschel they would change the whole style of illustration, which should, in truth, be in colour."

Mr. Carl Hentschel started with four paid workers in 1887; paid £8 9s. wages in the first week, did a little job for Cassell's, Limited, as a start—and to-day behold a staff nearly 400 strong. One almost hopes the qualification, "nearly," may remain awhile, remembering some risks of developments. Napoleon I. used to say, that "the great empires of the world had almost all died of indigestion." Enterprise has its own besetments. Happily there is little risk that he may overdo it, may overdo himself; may harness himself to the wheel. The city councillor, the O. P. clubman, the inveterate first-nighter, who is three-fourths of this Hentschel firm's money, and four-fourths of its directive power, is glad to be master of his business, but quite unwilling to be its slave. There was a touch of something almost like pathos for a moment when, at the summer outing at Windsor this year, Mr Hentschel said: "There are moods in which I feel I would far rather be working twice the hours in my shirt sleeves than carrying the responsibility of the big Fleet Street and South London establishments." No, he will remember "Festina lente"; he will ca' canny awhile.

But even at present figures, it is a notable growth. What are some causes? First, practical knowledge. Secondly, a policy of training one's own helpers, and almost invariably retaining one's apprentices. Thirdly, constant alertness to look into all illustration-producing methods, but great care not to be side-tracked. Fourthly, punctual delivery. Fifthly, enough imagination to realize what clients need; and determination to supply that need even at the cost it may be of an always open foundry; or of oneself paying many night visits to one's works, to doff one's evening dress, and worry personally through the last stages of a job. Sixthly? Well—I should specify the principal's particularly keen appreciation that the public wants colour, colour, colour—all the time; the public is like "Ouida," who says "I revel in colour, I perfectly roll in it." I should emphasise finally keen interest in one's workers, shown in a dozen ways; and to sum up all, keen, intensely keen interest in one's art and craft, in the work of one's hands.

There are difficulties. "The regular understanding is that only about two hours are allowed to us to do all the work for one daily paper," he told me, "and with some other dailies things are as bad or worse. When the poor fellows who had died in Submarine A1 were buried at Portsmouth, artists arrived at Waterloo Station about 11 o'clock, with sketches, and in about twenty minutes after receiving a drawing, I personally took over to the *Chronicle* something which the sub-editor could see, and by which to a certain extent he could judge; and in about an hour and a quarter the *Chronicle* had received a large half-page plate; and *finished*, mark you, ready for good printing. Not like some plates occasionally brought to us to finish off, because of the 'monks' and 'friars' the engraver has allowed to show on the paper.

"The simple fact is, it pays to maintain one's name. We often send a workable block in at some ridiculous time named; but quietly make a second, a better one, which just the little extra time we take makes possible. Then we send that round and ask the minder to change it. We don't charge for the two blocks. Again, customers should reflect upon the enormous practical force of sentiment in business. There is nothing in reason which our fellows won't do, to help out at a push a customer regularly placing his work and his confidence with us.

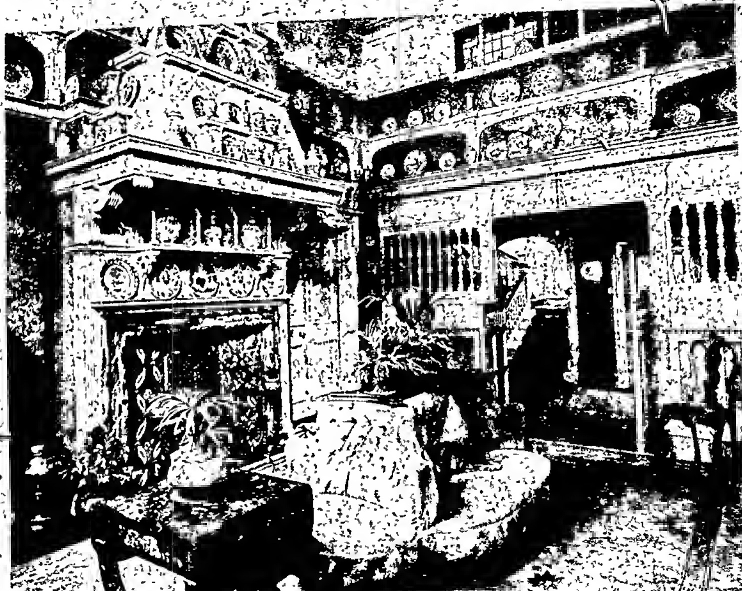
"Not that we are indifferent to reasonable hours and healthy conditions. During the heat wave we opened our Colortype works at 5 a.m., and the ordinary day closed about noon, and this was greatly appreciated. I feel that many London firms in many trades might start earlier and end earlier. It has made it easier to secure hearty co-operation of the employés, that I've been able to retain pretty well nineteen out of twenty of my apprentices. I want our fellows to grow up believing in the concern for themselves, for their own promotion and advantage.

"The fact is this question of engraving competence is a very serious one for the newspaper proprietors. It's all very well to say 'I've got £50,000, I'll start some coloured newspaper,' or 'I'll do this, that, or the other,' involving a great amount of finest half-tone, or three-colour work. The men competent to do this finest work aren't going to jump out of the ground, just because one sows sovereigns as men did in the legend, when someone sowed teeth. We've come to the conclusion after our seventeen years, that if we want a constant supply of first-rate ability—well, we've got to train it.

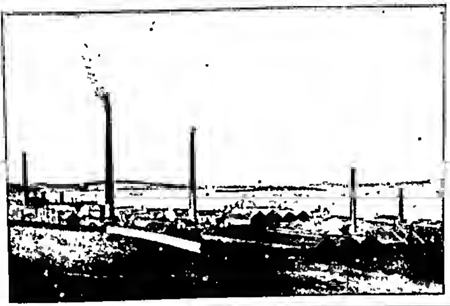
"And there again at every turn the advantage of practical knowledge comes in. For one thing, I don't ask anything irksome without realizing that I am doing so. I say to myself, 'I shouldn't much care to be doing that job,' and I have a sympathy with the one who's on to it. At the same time I also feel that in the same exigency I both could and would worry through with it, and feeling that, I naturally look to the worker, whoever he may be, to take it up and go at it.

"Then we get great encouragements which do wonders to hearten us up. Who would have dreamt even five years ago of seeing Messrs. Black sending out book after book most copiously illustrated with our colour work? And they're Scotsmen. They're not in business for their health. Depend upon it, they find that it pays. Again, who would have thought of seeing King Edward sign and send one of our large Colortype portraits of himself to the Kaiser as his Christmas card? Yet that's what he's done. It certainly is very stimulating to have such recognition in the world of letterpress art work.

"By the way"—and he looked rather oracular—"there is such a thing as a litho stone and a zinc and an aluminium plate. These all three are supposed to be our natural enemies. Don't be too sure of that. Process engraving and lithography may be of great service to each other yet. We shall see. Good bye."



SPECIMEN OF COLLOTYPE PRINTING ON ROUGH PAPER



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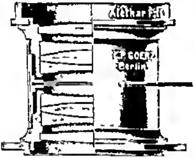

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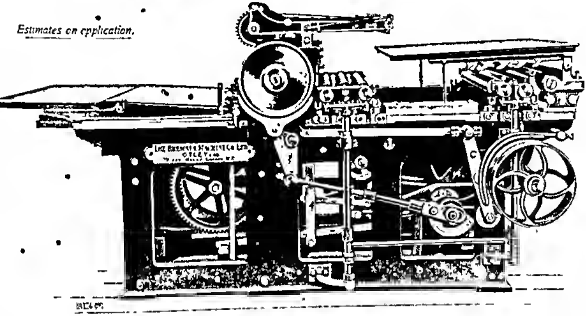

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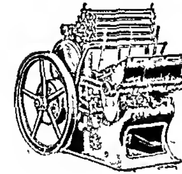

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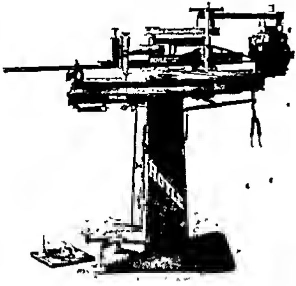
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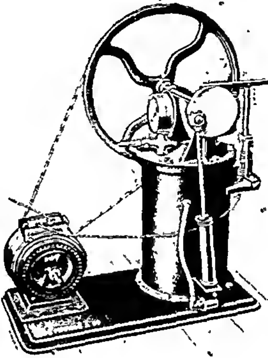

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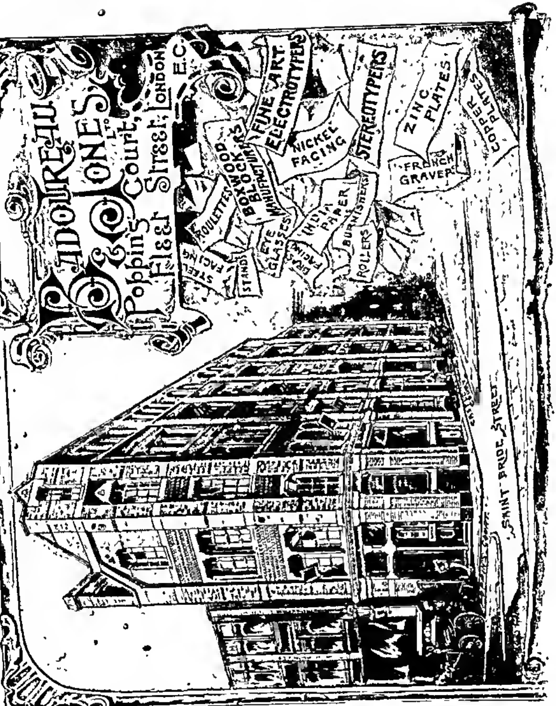
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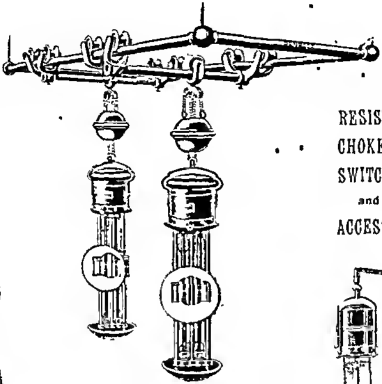
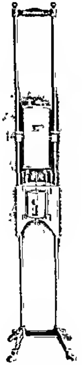


Penrose's Arc Lamp Traversing Gear and Double Carbon Arc Lamps.

RESISTANCES,
CHOKERS,
SWITCHES,
and all
ACCESSORIES.



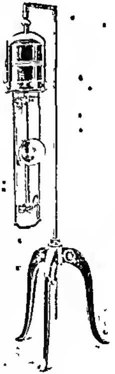
The "Parallel" Arc Lamp Stand, with Enclosed Arc.

NO FIRM

has studied the requirements of Process Workers so thoroughly as we have, and we can give reliable advice

PENROSE & CO.

109, Farringdon Road, LONDON, E.C.



Arc Lamp Standard, with Single Carbon Open Arc.


The ARC ENGRAVING COMPANY Ltd
4 & 6 FARRINGDON AVENUE, LONDON. E.C.

I told you last year that when you have more work than
your staff can cope with to farm some out and not get into
such a mess with your contracts There is no doubt that they have got
a strong case against you & you may have to pay heavy damages
Now I can tell you of a firm that work exclusively for the Trade
& never touch first hand work & you can place all your overflow
work with them knowing that the strictest secrecy will be maintained
their work is good & delivery prompt & it does not matter what
stage the work is in they will print on the metal, make line
& half tone negs, etch & proof rout level & mount, & in fact
anything in the process line, you have only to drop a line
to J. A Johnston & Co. 4/5 Stonecutter St London, & find
out their prices which are very low